GPS AutoSteer System
Installation Manual

Supported Vehicles

CNH

Case Magnum		**New Holland**	
MX-180	MX-200	TG-210	TG-215
MX-210	MX-215	TG-230	TG-245
MX-230	MX-220	TG-255	TG-275
MX-255	MX-240	TG-285	TG-305
MX-275	MX-270		
MX-305	MX-285		

PN: 602-0201-01-A

LEGAL DISCLAIMER

Note: Read and follow ALL instructions in this manual carefully before installing or operating the AutoSteer system.

Note: Take careful note of the safety information in the Safety Information section and throughout this manual.

The manufacturer disclaims any liability for damage or injury that results from failure to follow the instructions and warnings set forth herein.

Please take special note of the following warnings:

1. There is NO obstacle avoidance system included in the manufacturer’s product. Therefore, users must always have an operator on the equipment when the AutoSteer system is in use to look for any obstacles including people, animals, trees, ditches, buildings, etc.
2. During installation of the AutoSteer system and during the Calibration and Tuning processes the vehicle's wheels turn from side to side and the vehicle moves. Be sure that all people and obstacles are clear of the vehicle before installation, calibration and tuning, or use of the AutoSteer system.
3. Use of the AutoSteer system is NOT permitted while the vehicle is on public roads or in public areas. Ensure that the system is OFF before driving on roads or in public areas.

Special Requirements

Tools

This list consists of the tools required to complete the installation. The installer is assumed to have a complete set of common installation tools.

Allen Hex Key 1/4”	11/16” open wrench	16mm open wrench
Allen Hex Key 3/16”	5/8” open wrench	17mm open wrench
Allen Key 5/32”	9/16” open wrench (2x)	18mm open wrench
Allen Hex Key 1/8”	1/2” open wrench	19mm open wrench
15/16” open wrench	7/16” open wrench	22mm open wrench
7/8” open wrench	1/2” 12 point ratcheting wrench	24mm open wrench
13/16” open wrench	15/16” socket wrench	32mm open wrench
3/4” open wrench	13mm open wrench	30mm socket
Breaker bar for 30mm socket	Hacksaw with steel cutting blade	Cleaning rags
Torque wrench for 30mm socket	Wire cutter small	5000 psi Pressure Gauge with a Short Hose and 1/8” Test Port Coupler that meets the SAE J1502 standard.
#1 Phillips screwdriver	Cleaning brush	Tape measure (12ft minimum)
#2 Phillips screwdriver	10 Foot Ladder	Fiberglass Cable Puller

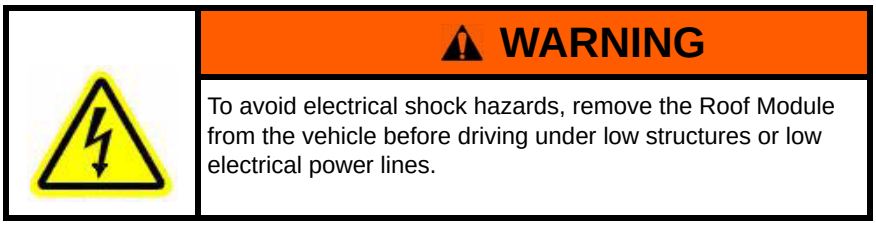
Safety Information

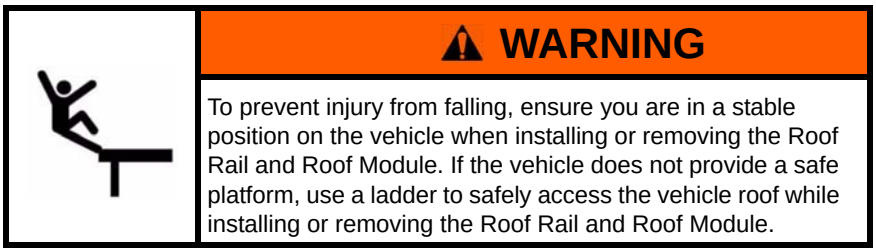
Warning Alerts

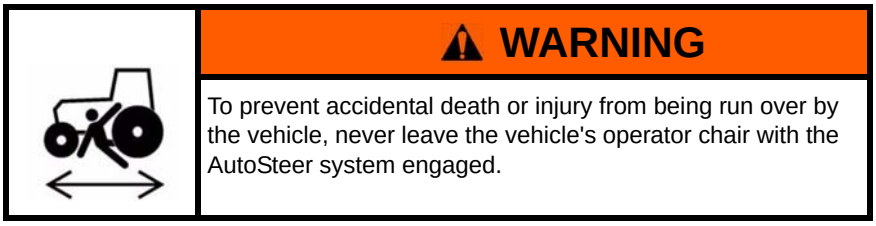
The AutoSteer system installer and manufacturer disclaim any responsibility for damage or physical harm caused by failure to adhere to the following safety requirements:

- As the operator of the vehicle, you are responsible for its safe operation.
- The AutoSteer system is *not* designed to replace the vehicle's operator.

Note: Verify all screws, bolts, nuts, hose connections, and cable connections are tight after the final installation of the AutoSteer system on the vehicle.


⚠ WARNING
To avoid electrical shock hazards, remove the Roof Module from the vehicle before driving under low structures or low electrical power lines.


⚠ WARNING
To prevent injury from falling, ensure you are in a stable position on the vehicle when installing or removing the Roof Rail and Roof Module. If the vehicle does not provide a safe platform, use a ladder to safely access the vehicle roof while installing or removing the Roof Rail and Roof Module.


⚠ WARNING
To prevent accidental death or injury from being run over by the vehicle, never leave the vehicle's operator chair with the AutoSteer system engaged.

⚠ WARNING

High-Pressure Fluid Hazard

Read this manual before installation. Wear hand and eye protection while performing hydraulic system maintenance. Relieve hydraulic system pressure before servicing the hydraulic system.

⚠ WARNING

To understand the potential hazards associated with the operation of AutoSteer system equipment read the provided documentation before installing the AutoSteer system on a vehicle.

⚠ WARNING

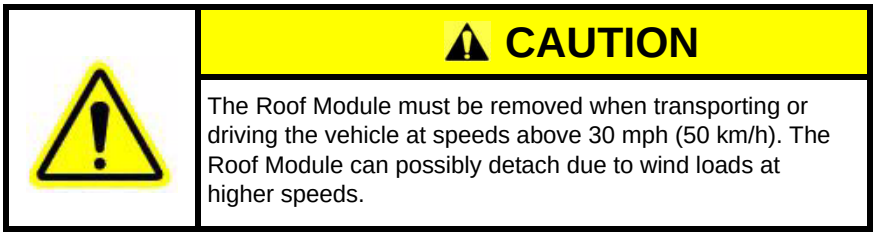
To prevent the accidental engagement of AutoSteer and loss of vehicle control while driving on roads, shut down the AutoSteer system (exit the program). Never drive on roads or in public areas with the AutoSteer system turned on.

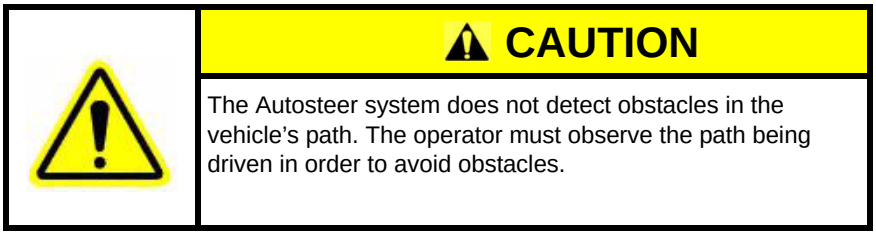
⚠ WARNING

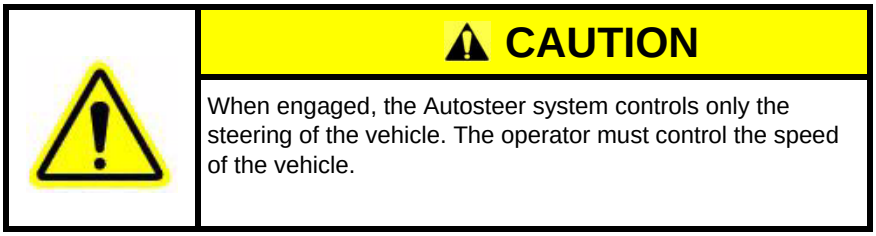
Do not stand close to the wheels and do not move the machine while you are adjusting the Relief Valve. Turn off the engine and engage the parking brake before standing under or next to the machine.

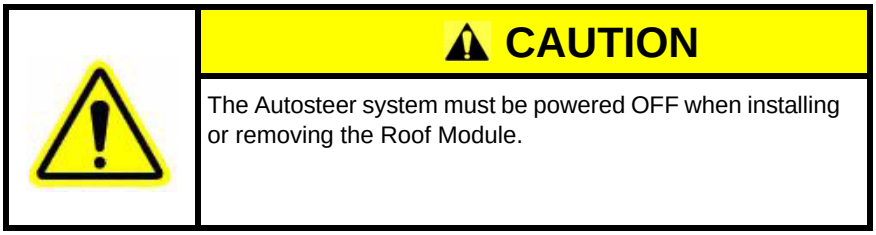
Caution Statements

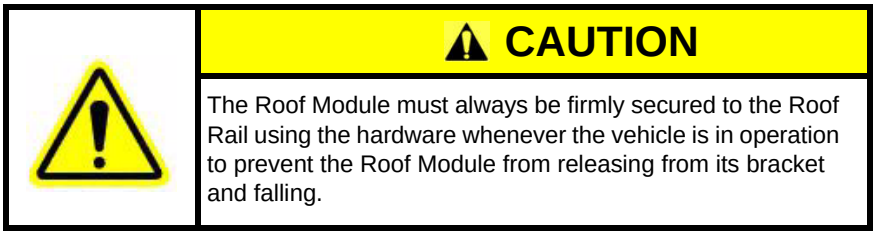
The steering system installer and manufacturer disclaim any responsibility for damage or physical harm caused by failure to adhere to the following safety requirements:


CAUTION
The Roof Module must be removed when transporting or driving the vehicle at speeds above 30 mph (50 km/h). The Roof Module can possibly detach due to wind loads at higher speeds.


CAUTION
The Autosteer system does not detect obstacles in the vehicle's path. The operator must observe the path being driven in order to avoid obstacles.


CAUTION
When engaged, the Autosteer system controls only the steering of the vehicle. The operator must control the speed of the vehicle.




CAUTION
The Roof Module must always be firmly secured to the Roof Rail using the hardware whenever the vehicle is in operation to prevent the Roof Module from releasing from its bracket and falling.

Vehicle Requirements

The vehicle steering and hydraulic systems must be in good working order before installing the AutoSteer system. Check for loose or worn parts. Before installing the AutoSteer system drive the vehicle and confirm that it steers straight and the wheels can be turned from lock to lock. Check the steering system hydraulic hoses and connections to ensure there are no oil leaks.

The vehicle electrical system and battery must be in good working order.

The vehicle should be fully cleaned before installing the AutoSteer system. A clean vehicle will improve the overall installation and cable routing and will also reduce the chance for oil contamination when the hydraulic connections are opened. It is important to clean the area around the steering cylinders, frame, steering Orbitrol, and cab.

Note: If your vehicle is Accuguide ready and has a factory installed AutoSteer valve, you will need a different installation kit. Contact your dealer for details.

Important Information

Note: Verify all screws, bolts, nuts, and cable connections are tight after the final installation of the AutoSteer system on the vehicle.

Technical Support

Refer to your Display user manual for technical support information.

Contact Information

Refer to your Display user manual for contact information.

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Installation Overview

This **Installation Overview** chapter contains information in the following sections:

- *Vehicle Inspection*
- *Kit Overview*
  - *Assemblies*
    - *Steering Valve Kit Components*
    - *Hose Kit Components*
    - *Bracket Kit Components*
- *Installation Procedure Outline*
- *Cable Diagram*

This installation guide describes the installation of the steering system on several models of New Holland TG and Case MX wheeled vehicles. The installation kit PN: 188-0013-01 is used on both series of these wheeled vehicles.

Note: The installation Kits for the Case MX and New Holland TG series of vehicles covered in this manual use the identical sub-assembly kits.

Vehicle Inspection

Before you install this steering system, confirm the vehicle steering system is in good working order. Drive the vehicle and verify the vehicle's correct working order. Also, ensure the following system operations and components:

- Check to see if you can turn the front wheels from lock to lock.
- Ensure the vehicle steers straight.
- Check for loose or worn steering components.
- Check for hydraulic fluid leaks throughout the system.
- Ensure the hydraulic fluid level is correct.
- Service the vehicle if the steering is not in good working order.
- Check the hose fitting type used on the vehicle's steering Orbitrol. If the Orbitrol uses standard ORFS hose fittings, no extra parts are required. If the Orbitrol uses Snap-to-Connect (STC) type fittings, you must order an STC adapter kit to complete the hose installation (PN: 500-0299-01). Contact your dealer for details.

Note: Older vehicles typically use the standard ORFS fittings while newer vehicles use the STC fittings.

Kit Overview

The Case MX and New Holland TG vehicles share the same top-level Installation Kit PN: 188-0013-01, which contains the components shown in *Figure 1-1* and detailed in *Table 1-1*. The *Assemblies* section of this manual contains the sub-assembly identification information.

Note: If your Case MX or New Holland TG vehicle is Accuguide Ready or Intellisteer Ready, your dealer offers a specific installation kit that plugs into the vehicle's factory installed components. Contact the dealer for details.

Figure 1-1 Case MX and New Holland TG Kit Components (PN: 188-0013-01)

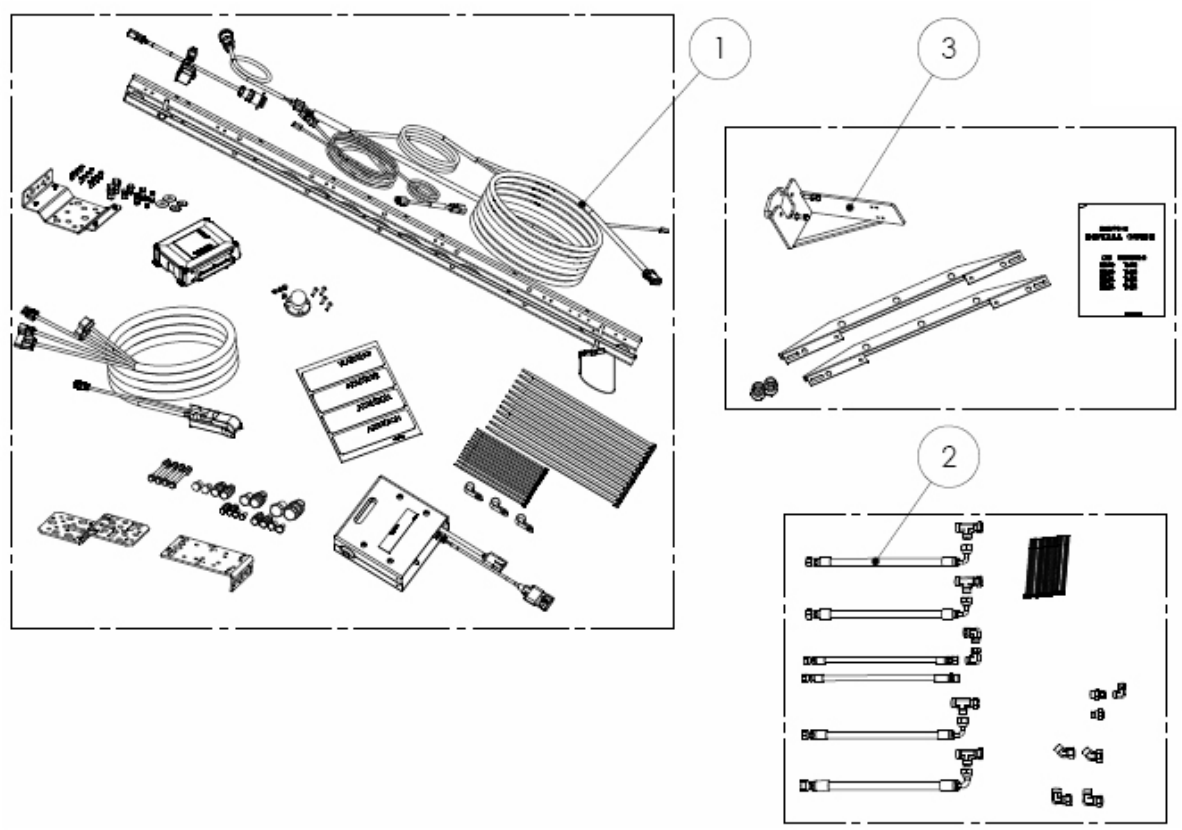


Table 1-1 Case MX and New Holland TG Kit Components (PN: 188-0013-01)

Item	Component	Part Number
1.	Steering Valve Kit	153-0001-01
2.	Hydraulic Hose Kit	500-0294-02
3.	Bracket Kit	152-0012-01

Assemblies

The Case MX and New Holland TG vehicle installation kit contains the following components:

- *Steering Valve Kit Components*
- *Hose Kit Components*
- *Bracket Kit Components*

Steering Valve Kit Components

Figure 1-2 Steering Valve Kit Components (PN: 153-0001-01)

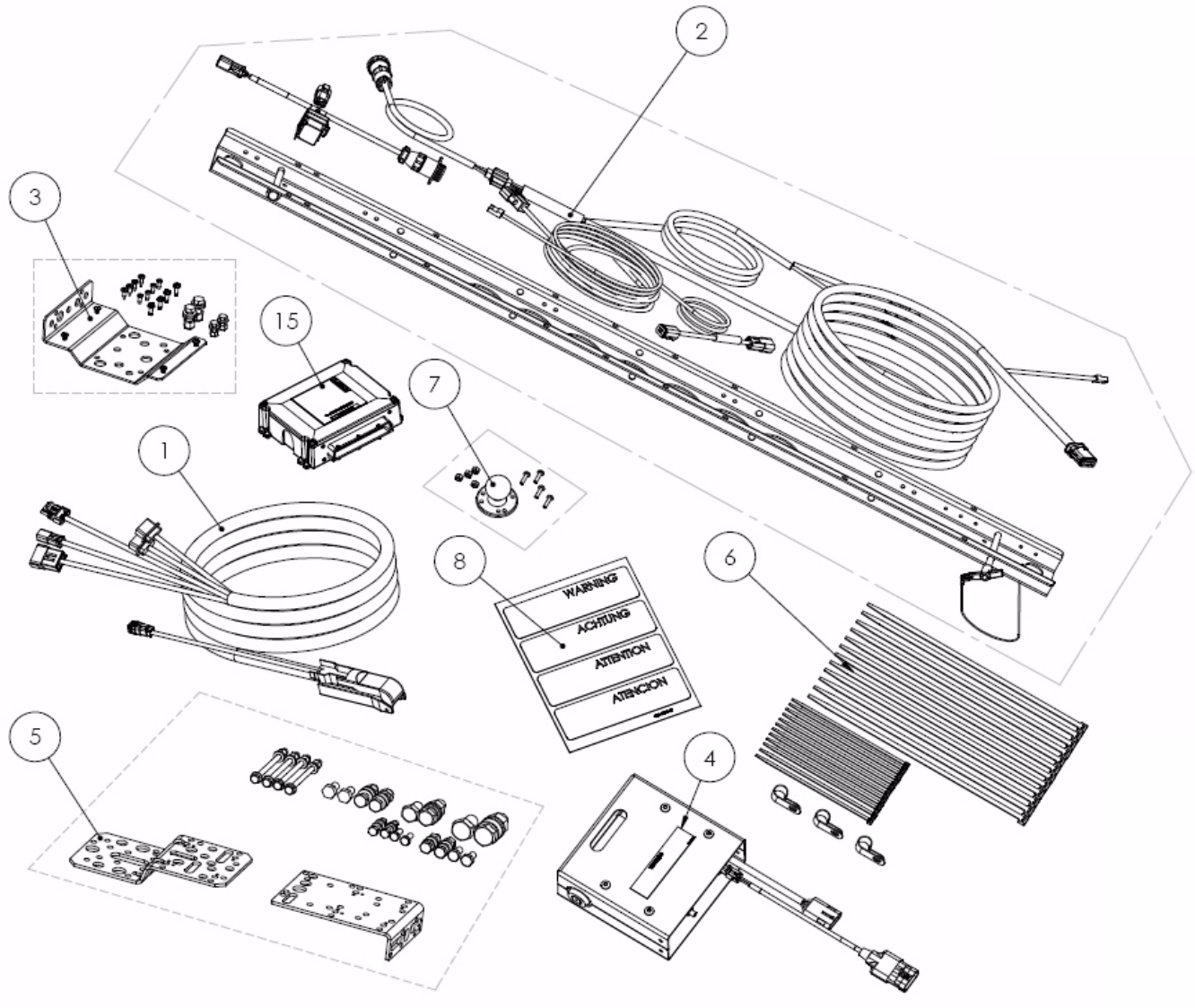


Table 1-2 Steering Valve Sub-Assembly Components (PN: 153-0001-01))

Item	Component	Part Number
1.	SA Module Harness	201-0371-02
2.	Common Installation Kit	200-0497-02
3.	SA Module Bracket	200-0190-01
4.	Steering Valve Assembly	200-0457-01
5.	Steering Valve Bracket Kit	200-0434-01
6.	Mounting Hardware	200-0076-01
7.	Display Mounting Base Assembly	200-0508-01
8.	Warning Labels	603-0074-01
15.	SA Module Assembly	200-0206-01

Hose Kit Components

Figure 1-3 Hose Kit Components (PN: 500-0294-02)

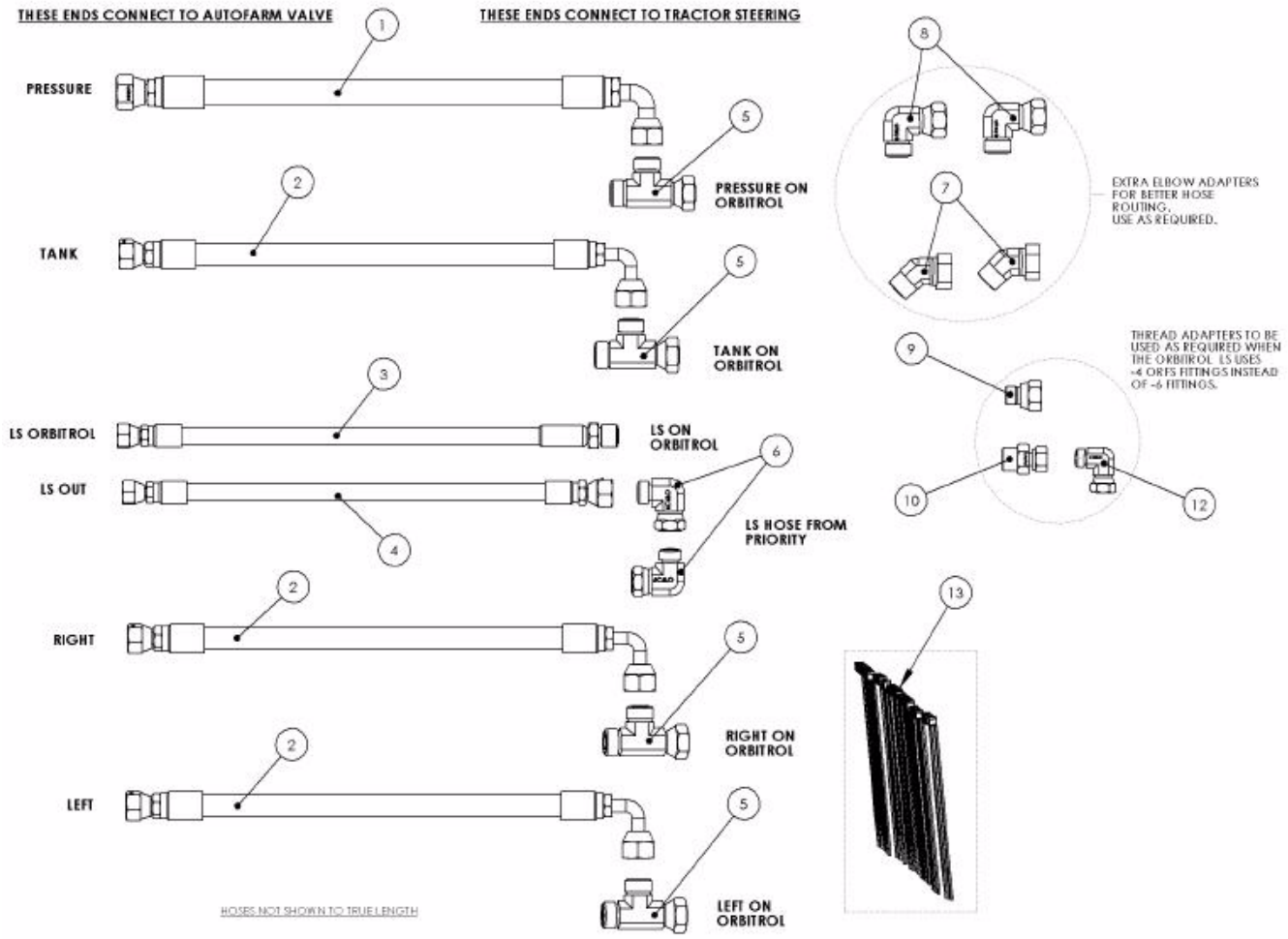

THESE ENDS CONNECT TO AUTOFARM VALVE
THESE ENDS CONNECT TO TRACTOR STEERING
PRESSURE
TANK
LS ORBITROL
LS OUT
RIGHT
LEFT
PRESSURE ON ORBITROL
TANK ON ORBITROL
LS ON ORBITROL
LS HOSE FROM PRIORITY
RIGHT ON ORBITROL
LEFT ON ORBITROL
HOSES NOT SHOWN TO TRUE LENGTH
EXTRA ELBOW ADAPTERS FOR BETTER HOSE ROUTING, USE AS REQUIRED.
THREAD ADAPTERS TO BE USED AS REQUIRED WHEN THE ORBITROL LS USES -4 ORFS FITTINGS INSTEAD OF -6 FITTINGS.

Table 1-3 Hydraulic Kit Components (PN: 500-0294-02)

Item	Component	Part Number
1.	Hose Assembly 1/2” x 54”	F451TC-JCJ9080808-54
2.	Hose Assembly 3/8” x 54”	F451TC-JCJ9060806-54
3.	Hose Assembly 1/4” x 54”	F451TC-JCJO040604-54
4.	Hose Assembly 1/4” x 54”	F451TC-JCJC040604-54
5.	Adapter Tee	8 R6LO-S
6.	Adapter 90 Degree	6C6LO
7.	Adapter 45 Degree	8 V6LO-S

Item	Component	Part Number
8.	Adapter Elbow	8 C6LO
9.	Adapter Reducer	6-4 TRLON-S
10.	Adapter Expander	6-4 LOHL6-S
12.	Adapter Swivel Nut	4 C6LO
13.	Cable Ties[a]	200-0467-01

a. The colored cable ties included in the kit are used to identify the hydraulic hoses. Place identical colored cable ties at the ends of each hydraulic hose to positively identify the hose.

Note: The suggested hose color assignments are as follows:
Pressure - Red
Tank - Green
LS Orbitrol - Blue
LS Out - Gray
Steer Right - Yellow
Steer Left - Orange

Note: Vehicles using STC type hose fittings on the steering Orbitrol require an STC adapter kit, PN: 500-0299-01. Contact your dealer for details.

Bracket Kit Components

Figure 1-4 Bracket Kit Components (PN: 152-0012-01)

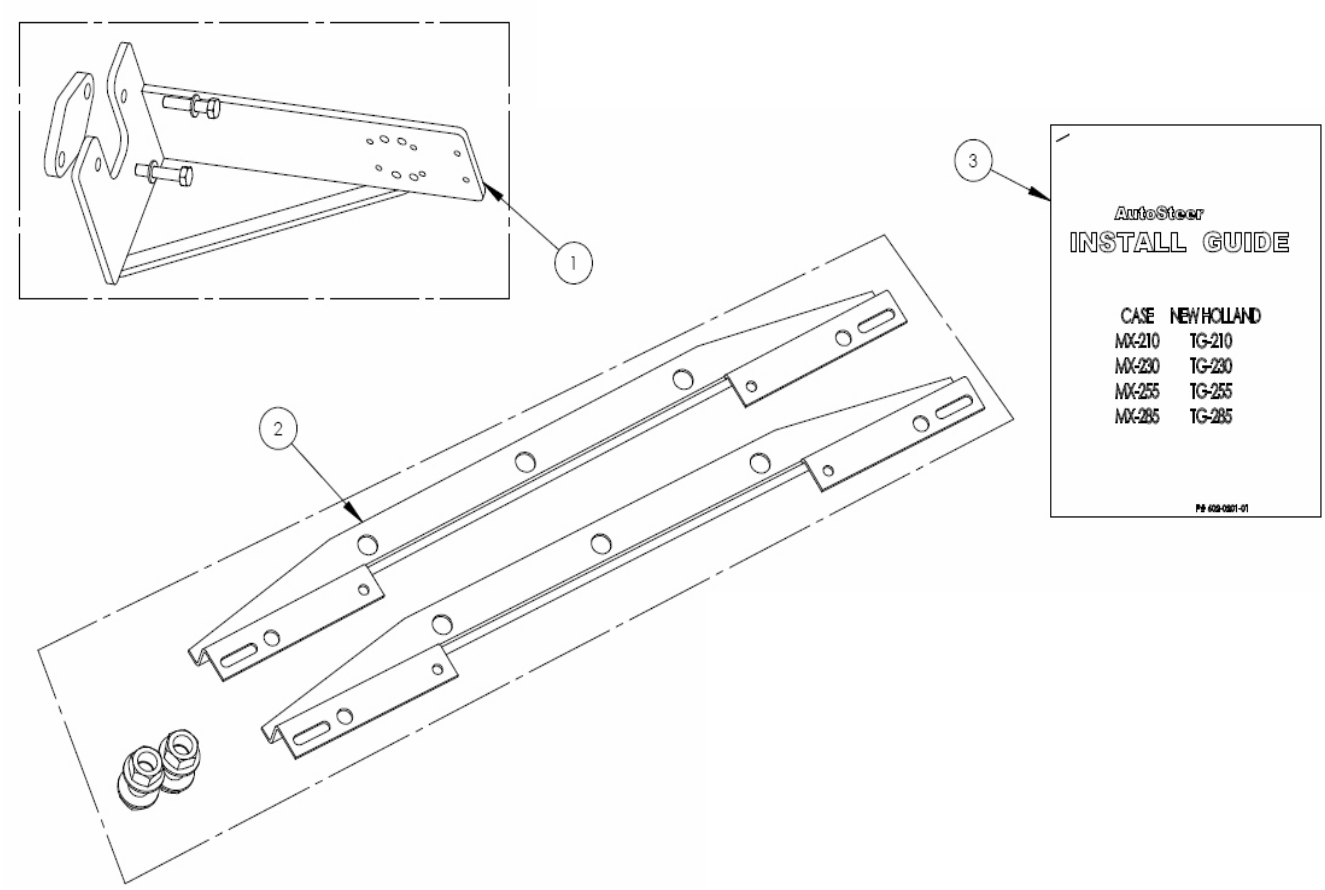


Table 1-4 Bracket Kit Components (PN: 152-0012-01)

Item	Component	Part Number
1.	Display Bracket Assembly	200-0031-03
2.	Roof Bracket Assembly	200-0387-01
3.	Installation Guide	602-0201-01

Installation Procedure Outline

Note: The system interconnect cable diagram in the *Cable Diagram* on page 9 section of this chapter shows the AutoSteer electrical connections.

1. Verify shipped components.

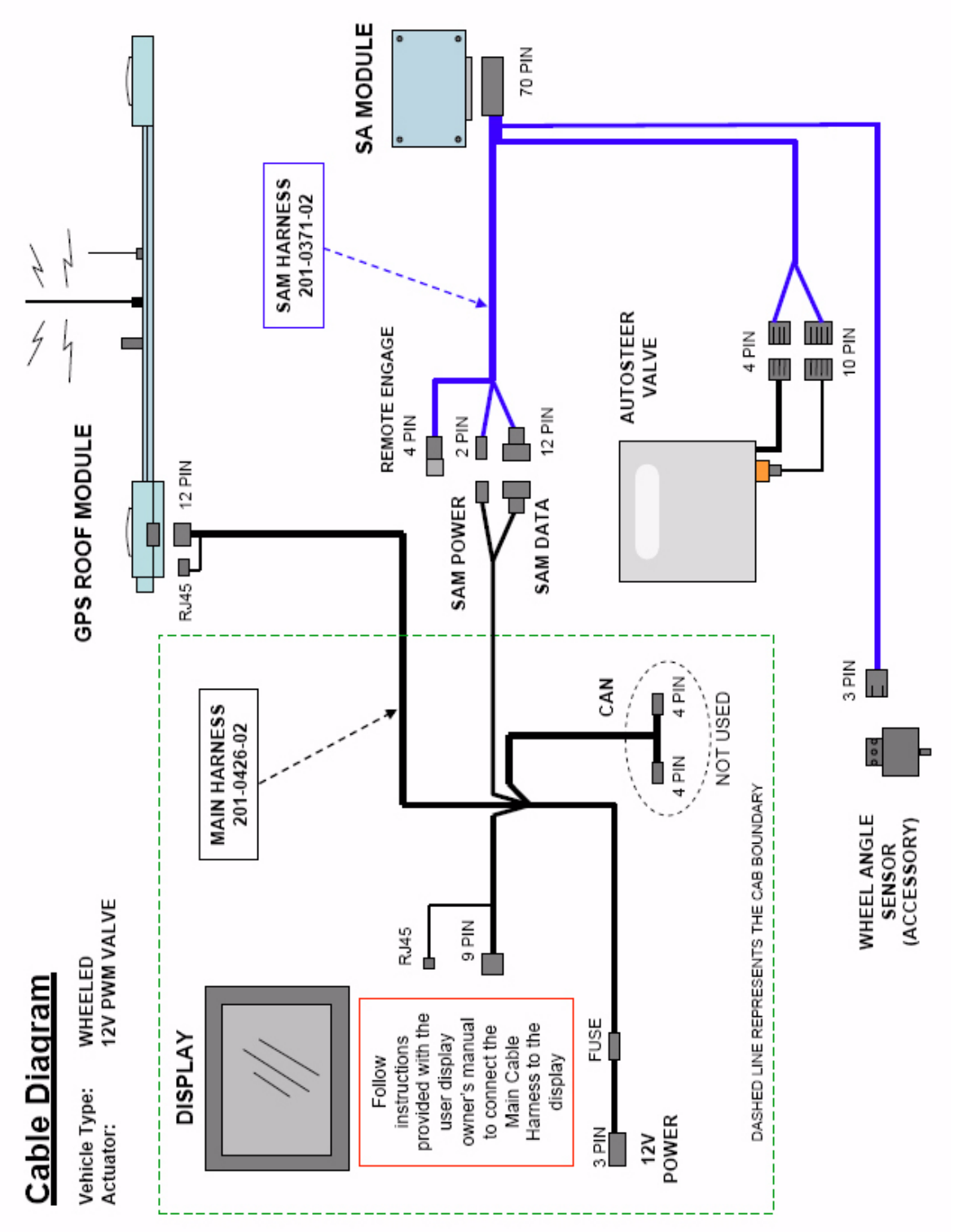
Note: *Step 2*, *Step 3*, *Step 4*, *Step 5*, *Step 8*, *Step 9*, and *Step 14* are skipped if installing an electric steering actuator.

2. Install the Hydraulic Steering Valve Assembly.
3. Install the Hydraulic Hoses.
4. Install the Wheel Angle Sensor. (Optional)
5. Install the SA Module.
6. Install the Roof Rail on the cab roof.
7. Install the Roof Module on the Roof Rail.
8. Install the SA Module Harness and route cables to the various sensors.
9. Route SA Module Harness towards the cab.
10. Install the Display Bracket and the RAM Mount Ball inside the cab.
11. Install the Display using a RAM Mount.
12. Install the Main Cable Harness and route cables to Roof Module and power connector.

Note: Instructions for connecting the vehicle kit cables to the Display can be found in the Display user manual.

13. Connect the Main Cable Harness to the Display Harness.
14. Connect the Main Cable Harness to the SA Module Harness.
15. Verify all connectors are properly coupled and secured.
16. Power ON the system.
17. Calibrate the vehicle.
18. Tune the vehicle.
19. Verify the system has been installed properly and operates satisfactorily.

Cable Diagram



Steering Valve Installation

This **Steering Valve Installation** chapter information is provided in the following sections:

- *Steering Valve Installation Procedure Overview*
- *Hose Kit*
- *Steering Valve Configuration*
  - *Steering Valve Configuration*
- *Install the Steering Valve Bracket*
- *Accessing the Orbitrol*
  - *Case MX Orbitrol Access*
  - *New Holland TG Orbitrol Access*
- *Hydraulic Hose Connection Procedures*
  - *O-Ring Face Seal (ORFS) Fitting Connectors*
  - *Snap-To-Connect (STC) Fitting Connectors*
  - *ORFS Hydraulic Hose Connection Procedure*
  - *Connect Hoses to Orbitrol and Steering Valve*
- *Alternate Hose Routing*
- *Pressure Transducer Installation*
- *Adjusting the Relief Valve*
- *Steering Valve Installation Checklist*

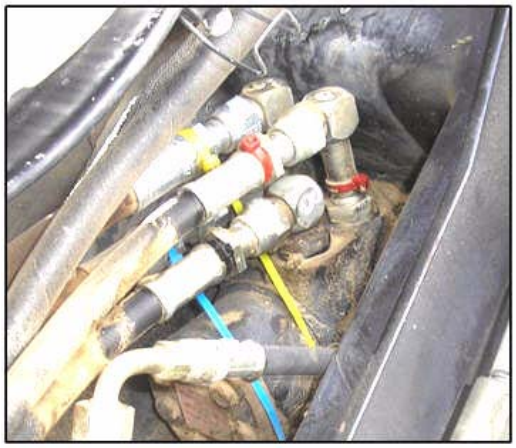
Note: The Case MX and the New Holland TG series vehicles use the same parts for the Steering Valve installation. The only difference is the way the Orbitrol is accessed.

Steering Valve Installation Procedure Overview

Note: Before beginning the hydraulic installation procedure, you should identify the type of hose fitting connections present on your vehicle. Newer vehicles have Snap-To-Connect (STC) hose fittings. Older vehicles may have O-Ring Face Seal (ORFS) hose fittings. The two types of hose fittings are shown in *Figure 2-1*.

Note: You can use a fiberglass cable puller to make it easier to pull the hydraulic hoses and electrical cables through and around the vehicle.

Figure 2-1 Hose Fitting Types



ORFS Fittings

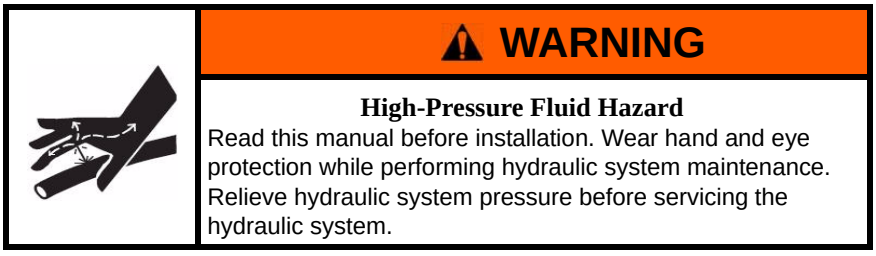
STC Fittings

1. Ensure the Steering Valve plug and orifice configuration is correct before installing the Steering Valve.

Note: See the *Steering Valve Configuration* section for Steering Valve plug and orifice configuration information.

---

2. Install the Steering Valve bracket and Steering Valve on the vehicle.
3. Connect the six hoses between the Steering Valve and the vehicle steering unit (Orbitrol).
4. Check for oil leaks.
5. Adjust the Relief Valve.
6. Perform a functional test to confirm correct Steering Valve operation.


WARNING
High-Pressure Fluid Hazard
Read this manual before installation. Wear hand and eye protection while performing hydraulic system maintenance. Relieve hydraulic system pressure before servicing the hydraulic system.

Hose Kit

Figure 2-2 Case MX and New Holland TG Hose Kit (PN: 500-0294-02)

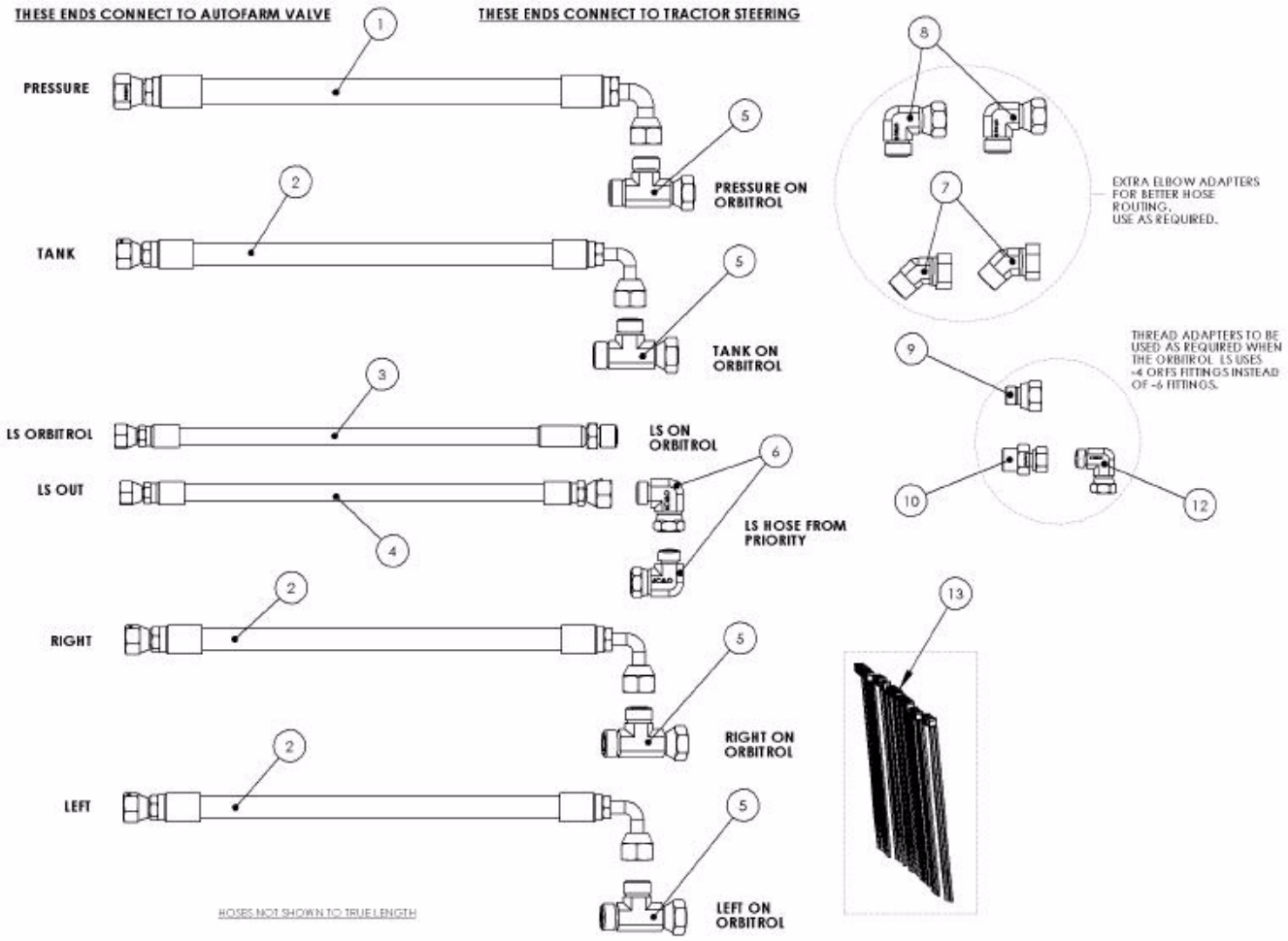

THESE ENDS CONNECT TO AUTOFARM VALVE
THESE ENDS CONNECT TO TRACTOR STEERING
PRESSURE
PRESSURE ON ORBITROL
TANK
TANK ON ORBITROL
LS ORBITROL
LS ON ORBITROL
LS OUT
LS HOSE FROM PRIORITY
RIGHT
RIGHT ON ORBITROL
LEFT
LEFT ON ORBITROL
HOSES NOT SHOWN TO TRUE LENGTH
EXTRA ELBOW ADAPTERS FOR BETTER HOSE ROUTING, USE AS REQUIRED.
THREAD ADAPTERS TO BE USED AS REQUIRED WHEN THE ORBITROL LS USES -4 ORFS FITTINGS INSTEAD OF -6 FITTINGS.

Table 2-1 Case MX and New Holland Hose Kit Components (PN: 500-0294-02)

Item	Component	Part Number
1.	Hose Assembly 1/2” x 54”	F451TC-JCJ9080808-54
2.	Hose Assembly 3/8” x 54”	F451TC-JCJ9060806-54
3.	Hose Assembly 1/4” x 54”	F451TC-JCJO040604-54
4.	Hose Assembly 1/4” x 54”	F451TC-JCJC040604-54
5.	Adapter Tee	8 R6LO-S
6.	Adapter 90 Degree	6C6LO
7.	Adapter 45 Degree	8 V6LO-S

Item	Component	Part Number
8.	Adapter Elbow	8 C6LO
9.	Adapter Reducer	6-4 TRLON-S
10.	Adapter Expander	6-4 LOHL6-S
12.	Adapter Swivel Nut	4 C6LO
13.	Cable Ties[a]	200-0467-01

a. The colored cable ties included in the kit are used to identify the hydraulic hoses. Place identical colored cable ties at the ends of each hydraulic hose to positively identify the hose.

The suggested hose color assignments are as follows:
Pressure - Red
Tank - Green
LS Orbitrol - Blue
LS Out - Gray
Steer Right - Yellow
Steer Left - Orange

Note: Vehicles using STC type hose fittings on the steering Orbitrol require an STC adapter kit, PN: 500-0299-01. Contact your dealer for details.

Steering Valve Configuration

1. Use a 3/16” Allen key to remove the four cover screws. See *Figure 2-3*.
2. Remove the front cover to access the hose connections, Pressure Transducer, and Relief Valve. See *Figure 2-3*.

Note: *Figure 2-4* shows the purpose for each of the hydraulic connections on the Steering Valve assembly.

Figure 2-3 Steering Valve Assembly

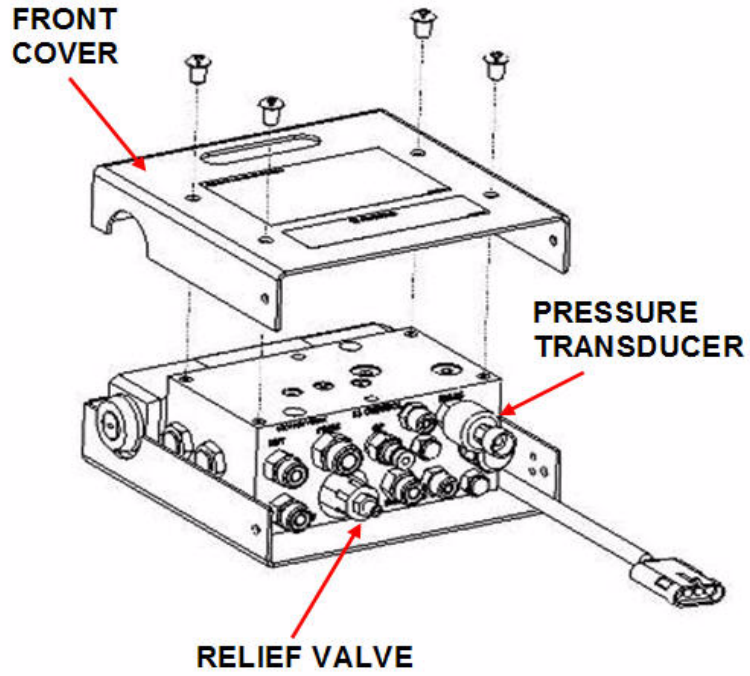
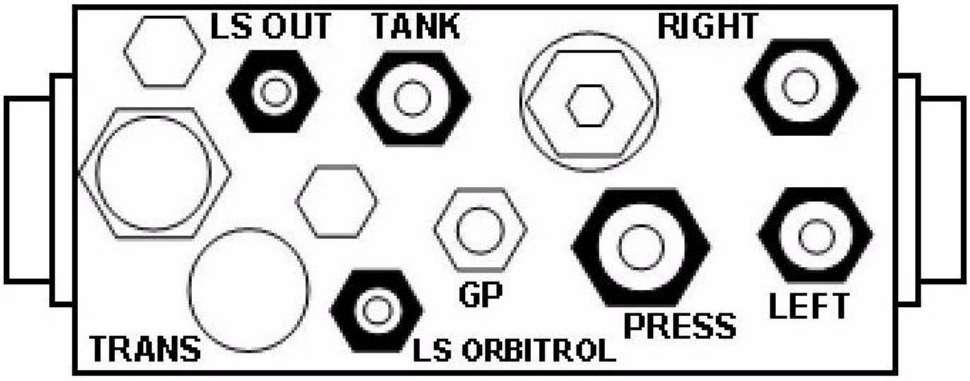


Figure 2-4 Steering Valve Port Identification



Note: The ports shown in *Figure 2-4* are upside-down relative to the ports shown in *Figure 2-3*. *Table 2-2* shows the Steering Valve functions.

Table 2-2 Steering Valve Functions and Fitting Sizes

Hose Adapter	Fitting Type/Size
PRESS = PUMP PRESSURE	-8 ORFS
TANK = TANK / RETURN	-6 ORFS
LS ORBITROL = LS FROM ORBITROL	-4 ORFS
LS OUT = LS (to Priority Valve)	-4 ORFS
LEFT = LEFT STEERING CYLINDER	-6 ORFS
RIGHT = RIGHT STEERING CYLINDER	-6 ORFS
GP = DIAGNOSTICS PORT	1/8” (SAE J1502)
TRANS = PRESSURE TRANSDUCER	SAE - 4 ORB.

Steering Valve Configuration

The Steering Valve must be properly configured for correct operation. The Case MX and the New Holland TG vehicles use the factory default valve plug and orifice configuration.

Note: Other types of valve installations on this vehicle, such as a Power Beyond hookup require special configurations of the internal plugs and orifices. Contact customer service before attempting other types of hydraulic installations that are not covered in this manual.

Note: Do not install this Steering Valve on other vehicles without the appropriate installation manual. Incorrect valve configuration and wrong hose connections on other types of steering systems can cause immediate severe pump damage.

1. Remove the front Steering Valve cover using a 3/16” hex key to loosen the four screws.
2. Identify the three threaded plugs. See *Figure 2-5*.

Figure 2-5 Steering Valve With Cover Removed

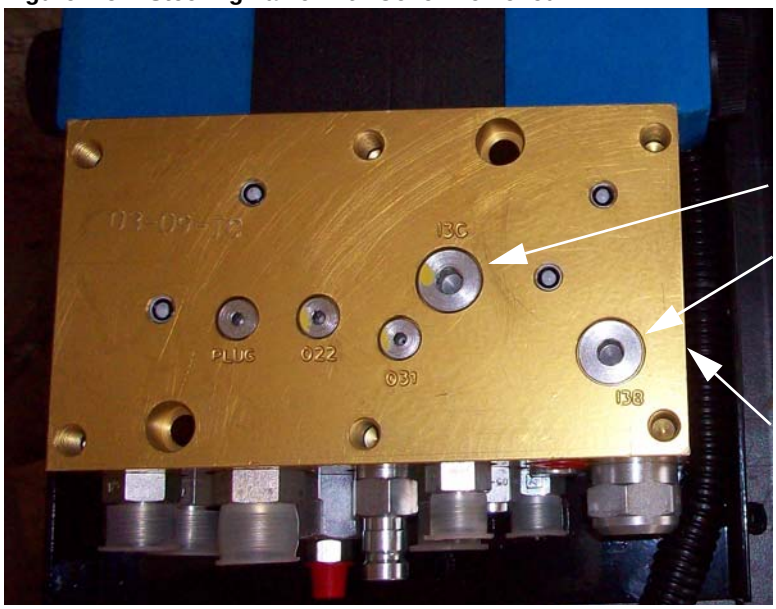
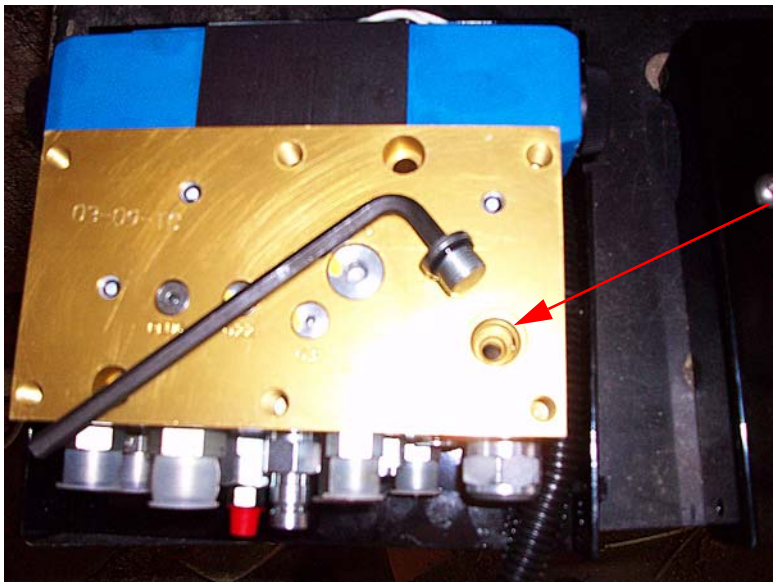


Table 2-3 Plug and Orifice Configuration Summary

Type of Installation	13A	13B	13C
Factory Default Configuration	Plug	Open	Plug
Orbitrol Hookup Installation	Plug	Open	Plug

3. Identify the large external access plug identified in position **13B**.
4. Remove the external plug in position **13B** using a 1/4” hex key. See *Figure 2-6*.

Figure 2-6 Removing External Plug



5. Confirm there is not an internal plug installed in position **13B**.
6. If present, remove the internal plug from **13B** position using a 1/8” hex key.
7. Re-install the large external plug in position **13B**.
8. The Steering Valve is now ready to be installed on the vehicle.

Install the Steering Valve Bracket

On Case MX and New Holland TG vehicles, the Steering Valve is installed on the vehicle frame left side just ahead of the cab in the position shown in *Figure 2-7* (Case MX shown). A universal valve bracket is secured to the vehicle using existing bolts on the vehicle. All hoses are connected to the steering unit (Orbitrol) under the engine hood in front of the cab.

Figure 2-7 Case MX Steering Valve Location

1. Locate the two bolts that secure the step bracket on the vehicle left side. See *Figure 2-8*.

Note: The lower bolt is used to secure the Steering Valve bracket.

Figure 2-8 Step Bracket Bolts

2. Remove the lower bolt using a 30mm socket wrench or combination wrench. See *Figure 2-9*.

Figure 2-9 Removing Lower Step Bracket Bolt

3. Install the “S” bracket in the position shown in *Figure 2-10*.

Note: The large oblong hole will be used. Tighten the bolt to 250 ft.-lbs (340 Nm) while holding the bracket in a horizontal position as shown in *Figure 2-10*.

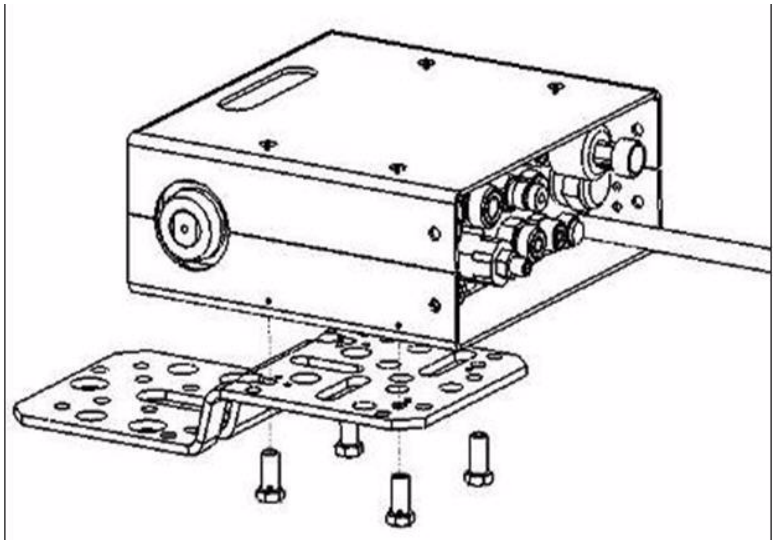
Figure 2-10 Installing the Valve Bracket

4. Secure the Steering Valve onto the bracket in the position shown in *Figure 2-11* using four 5/16” hex screws.

Figure 2-11 Steering Valve Mounted on Bracket

5. Tighten the four screws using a 1/2” ratchet wrench. See *Figure 2-12*.

Figure 2-12 Mounting Steering Valve to Bracket



Accessing the Orbitrol

The first step of accessing the two different vehicle series are slightly different. However, upon accessing the Orbitrol the procedure for connecting the hydraulic hoses is identical.

- *Case MX Orbitrol Access*
- *New Holland TG Orbitrol Access*

Case MX Orbitrol Access

1. Open the hinged cover on the engine hood left side. Pull on the front air vent to open as shown in *Figure 2-13*.

Figure 2-13 Opening Case MX Engine Hood Cover

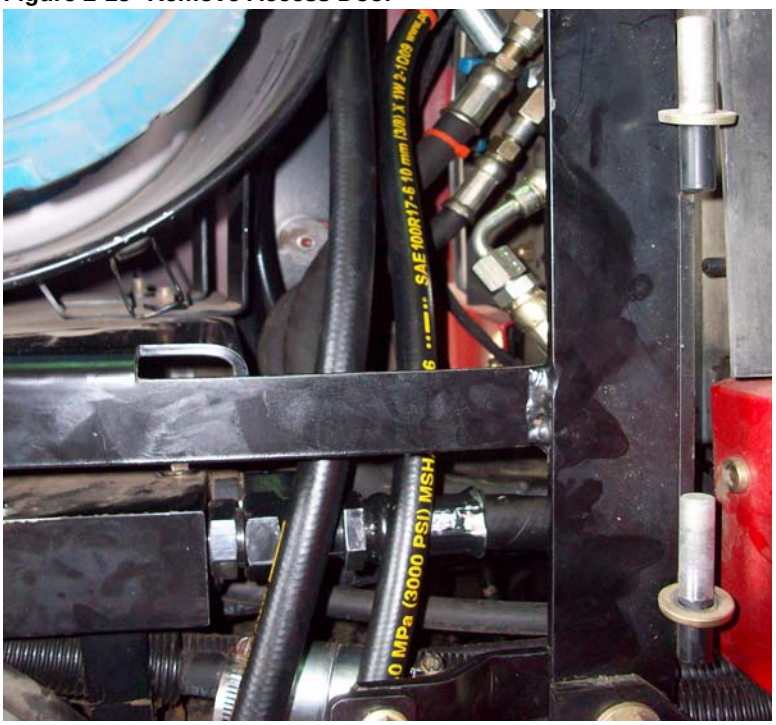
2. Open the hinged cover to gain access to the vehicle's steering unit (Orbitrol) from the vehicle's left-side. See *Figure 2-14*.

Note: The large round plastic part with the rubber gasket is the air filter cover that must be removed to facilitate access to the steering unit (see *Figure 2-14*). The filter cover can be removed by loosening all the latches around the perimeter. Observe the orientation of the filter cover so it can be re-installed in the same position when the installation is completed.

Figure 2-14 Case MX Engine Air Filter

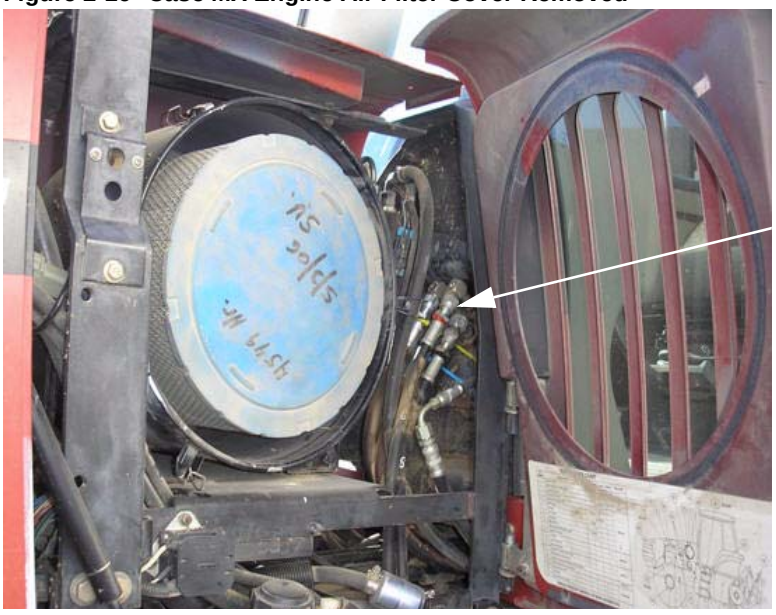
Note: The access door can be removed to allow more space to work by lifting it off of its hinges. See *Figure 2-15*.

Figure 2-15 Remove Access Door



3. After the air filter end cover removed you can see the steering unit (Orbitrol) where all hoses will be connected. See *Figure 2-16*.

Figure 2-16 Case MX Engine Air Filter Cover Removed



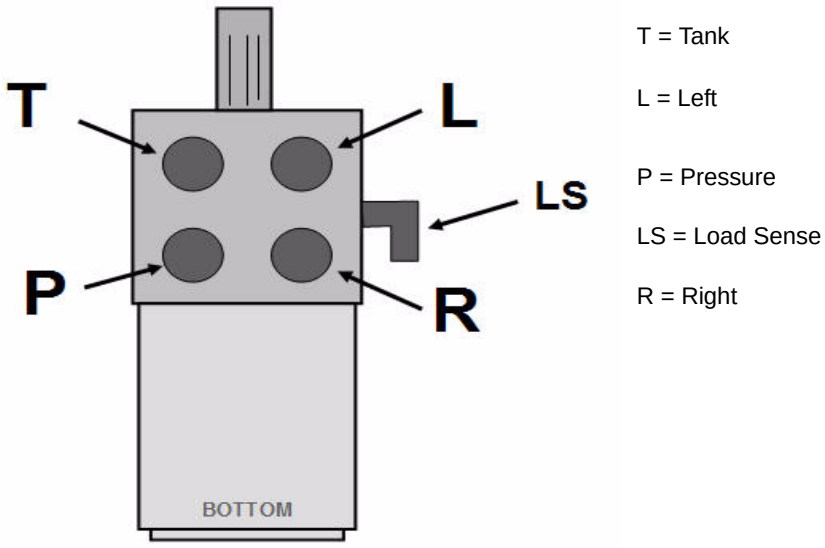
4. A close-up view of the steering unit on a Case MX vehicle is shown in *Figure 2-17*. The hose fittings shown are ORFS (O-Ring Face Seal) type.

Note: The hose towards the bottom (see *Figure 2-17)* that has a steel elbow is the Load Sense hose coming off the steering unit.

Figure 2-17 Case MX Orbitrol (Close Up)

5. The Orbitrol ports are aligned as shown in *Figure 2-18*.

Figure 2-18 Orbitrol Port Identification



New Holland TG Orbitrol Access

1. Pull the latch handle on the front of the engine hood to open the hood. See *Figure 2-19*.

Figure 2-19 Engine Hood Latch

2. Lift the front of the hood upwards as shown until it is in the fully raised position. See *Figure 2-20*.

Figure 2-20 New Holland Engine Hood Fully Opened

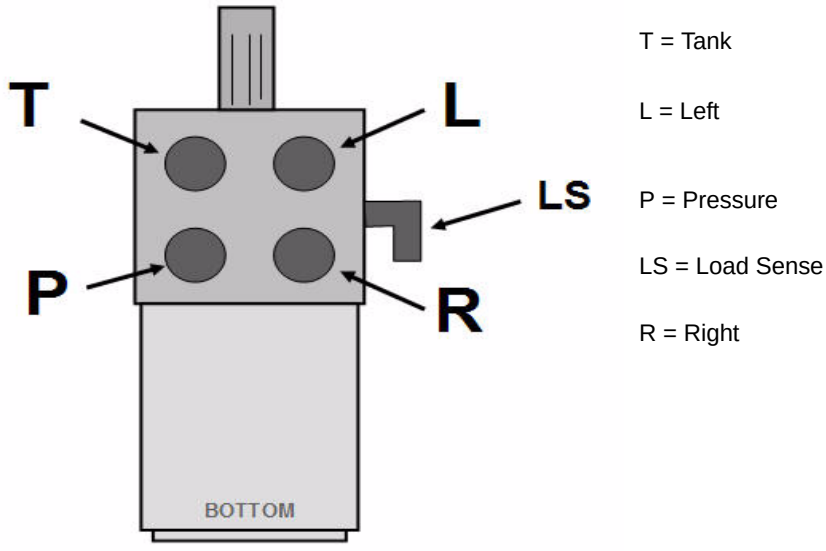
3. Access the steering unit (Orbitrol) on the right side of the vehicle. See *Figure 2-21*.

Note: The left side has a steel frame that hides the steering unit.

Figure 2-21 New Holland Orbitrol Location

4. The Orbitrol ports are aligned as shown in *Figure 2-22*.

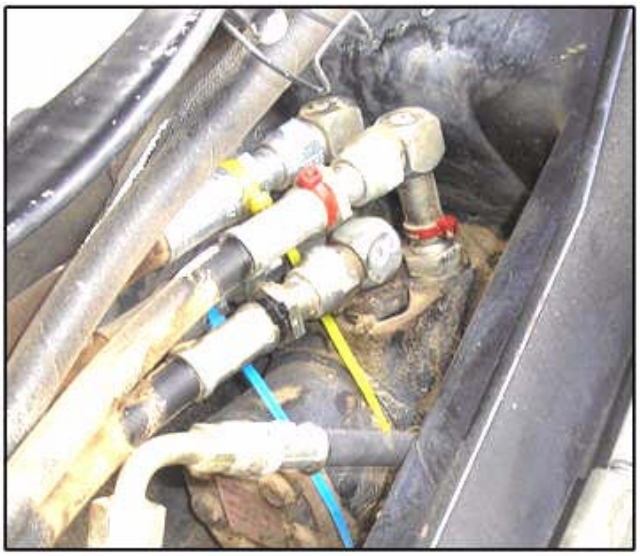
Figure 2-22 Orbitrol Port Identification



Hydraulic Hose Connection Procedures

There are two procedures for connecting the hydraulic hoses between the vehicle's Orbitrol and the Steering Valve. The first procedure is used with O-Ring Face Seal (ORFS) fitting connectors and the second uses Snap-To-Connect (STC) fitting connectors. You must check your vehicle's Orbitrol connectors to ensure you are using the correct procedure for your installation. *Figure 2-23* shows the two types of fittings on Orbitrol valves.

Figure 2-23 Hose Fitting Types



ORFS Fittings

STC Fittings

Use the following procedures for fitting and connecting the hoses, Orbitrol, and valves:

- *O-Ring Face Seal (ORFS) Fitting Connectors*
- *Snap-To-Connect (STC) Fitting Connectors*
- *ORFS Hydraulic Hose Connection Procedure*
- *Connect Hoses to Orbitrol and Steering Valve*

O-Ring Face Seal (ORFS) Fitting Connectors

Use this order to enable easier hose connections on the Steering Valve. Refer to *Figure 2-24* for hose identification numbers.

1. Install a Run Tee adapter on the Orbitrol's tank port. Connect a 3/8" hose [2] from the TANK port on the Steering Valve to the Tee adapter installed on the Orbitrol's Tank port.
2. Disconnect the LS hose from the Orbitrol.

Note: On most vehicles, the LS line will have a short jumper hose connected to the Orbitrol. Disconnect the main LS hose from the end of the short jumper hose when it is present.

---

3. Connect a 1/4" hose [3] from the LS OUT port on the Steering Valve to the main LS hose on the vehicle that was disconnected from the Orbitrol.
4. Connect a 1/4" hose [4] from the LS ORBITROL port on the Steering Valve to LS port on the Orbitrol.

Note: On vehicles that have the short LS jumper hose, connect to the end of the jumper hose.

---

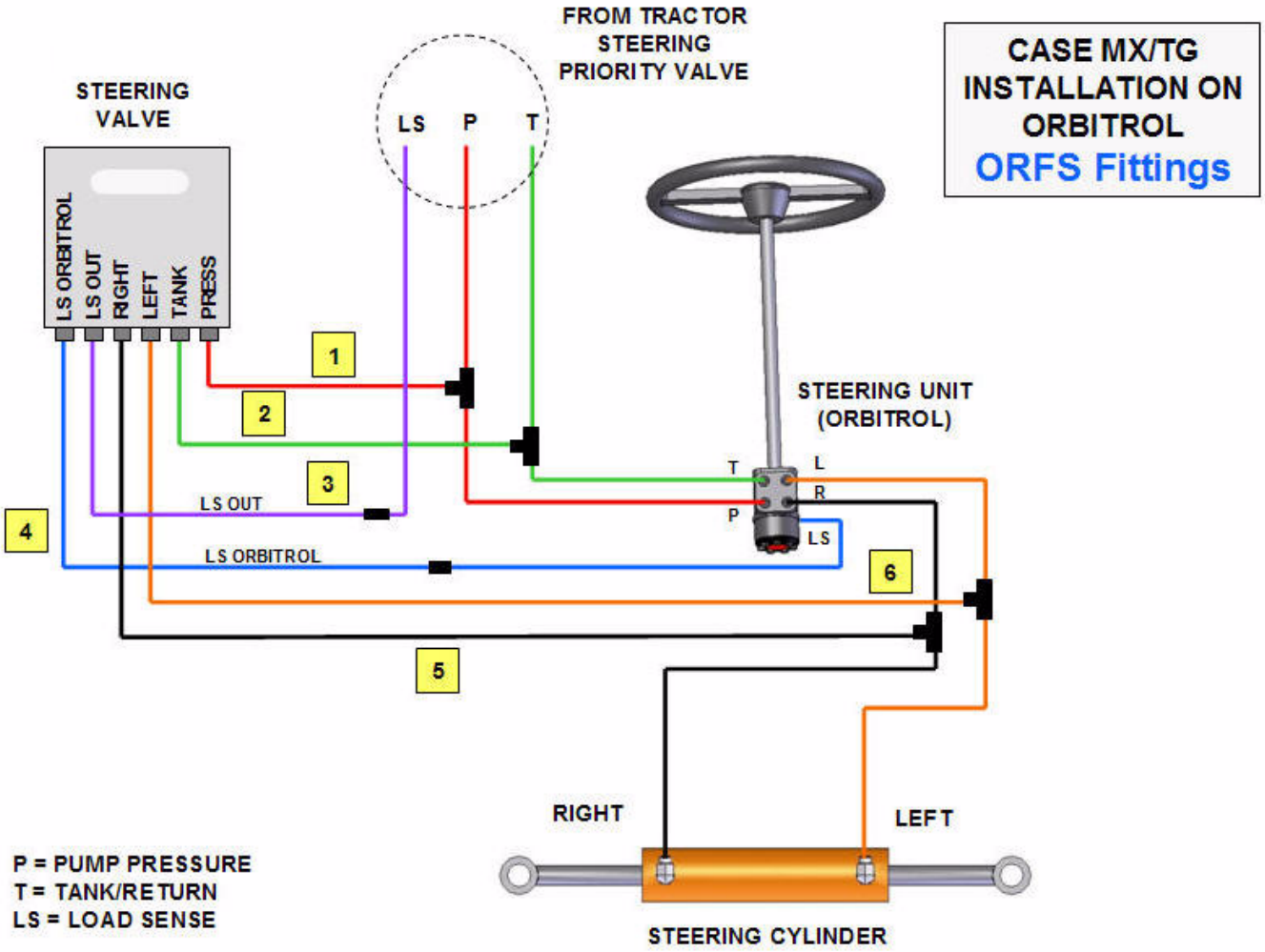
5. Install a Run Tee on the Orbitrol's Right steer port. Connect a 3/8" hose [5] from the RIGHT port on the Steering Valve to the Tee adapter installed on the RIGHT port on the Orbitrol.
6. Install a Run Tee on the Orbitrol's pressure port. Connect a 3/8" hose [1] from the PRESS port on the Steering Valve to the Tee installed on the Pressure port on the Orbitrol.
7. Install a Run Tee on the Orbitrol's Left steer port. Connect a 3/8" hose [6] from the LEFT port on the Steering Valve to the Tee installed on the Left port on the Orbitrol.
8. Double-check all hose connections and confirm they are connected to the correct ports at both ends.

Note: The Tank hose needs to be correctly connected to the Tank/Return to allow proper operation of the Relief Valve.

---

9. Tighten all hose connections at both ends.

Figure 2-24 ORFS Hydraulic Connection Diagram



Snap-To-Connect (STC) Fitting Connectors

Use this order to enable easier hose connections on the Steering Valve. Refer to *Figure 2-25* for hose identification numbers.

1. Install an STC Run Tee adapter on the Orbitrol's tank port. Connect a 3/8" hose [2] from the TANK port on the Steering Valve to the Tee adapter installed on the Orbitrol's Tank port.

Note: Use an STC-08 tool to open the connection.

---

2. Disconnect the LS hose STC fitting from the Orbitrol.

Note: Use an STC-06 tool to open the connection.

---

3. Connect a1/4" hose [3] from the LS OUT port on the Steering Valve to the main LS hose on the vehicle that was disconnected from the Orbitrol.

Note: Use a female STC adapter on the end of the LS OUT hose.

---

4. Connect a 1/4" hose [4] from the LS ORBITROL port on the Steering Valve to LS port on the Orbitrol. Use a male STC adapter.

5. Install an STC Run Tee on the Orbitrol's Right steer port. Connect a 3/8" hose [5] from the RIGHT port on the Steering Valve to the Tee adapter installed on the RIGHT port on the Orbitrol.

6. Install an STC Run Tee on the Orbitrol's pressure port. Connect a 3/8" hose [1] from the PRESS port on the Steering Valve to the Tee installed on the Pressure port on the Orbitrol.

7. Install an STC Run Tee on the Orbitrol's Left steer port. Connect a 3/8" hose [6] from the LEFT port on the Steering Valve to the Tee installed on the Left port on the Orbitrol.

8. Double-check all hose connections and confirm they are connected to the correct ports at both ends.

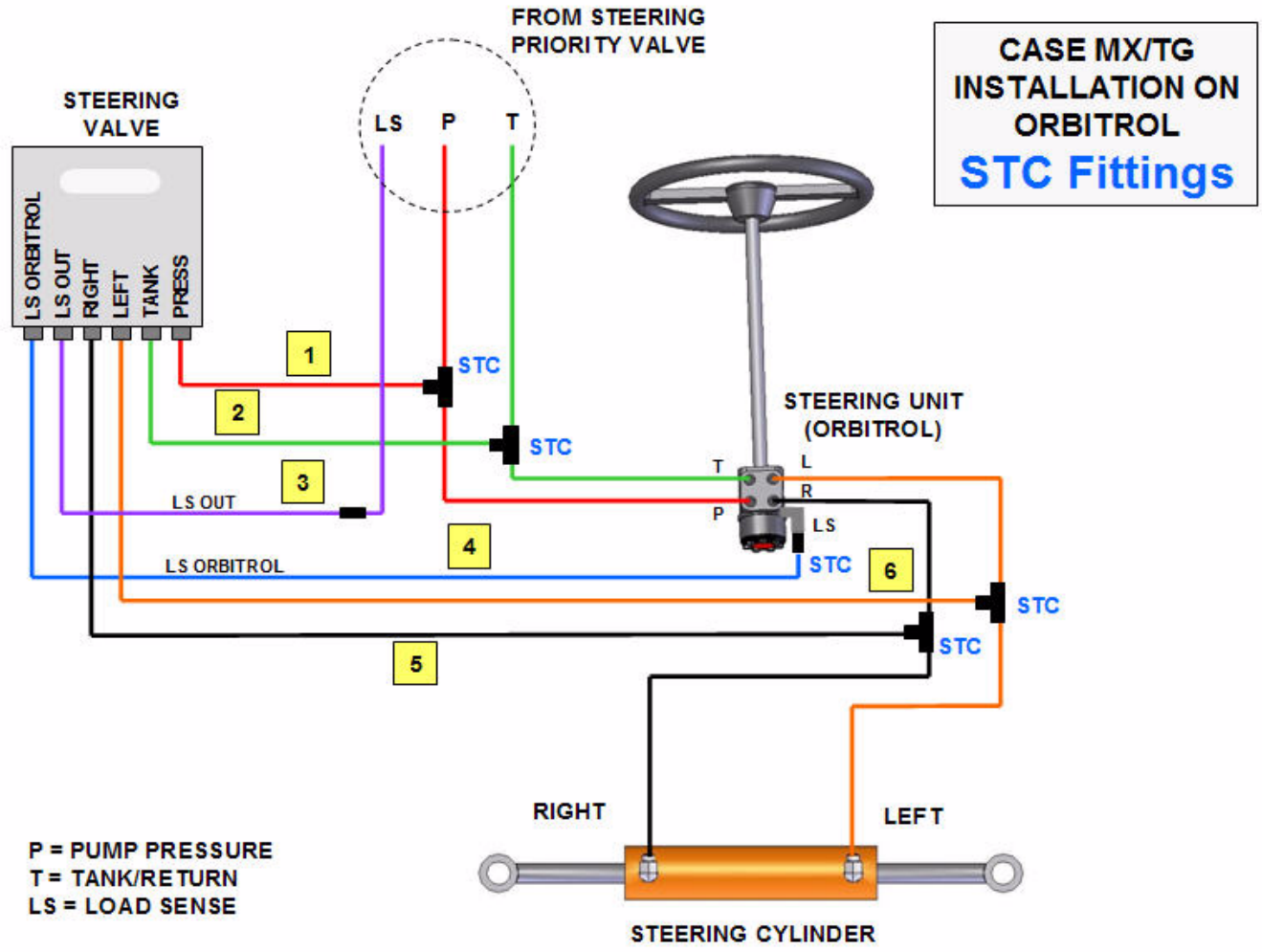
Note: The Tank hose needs to be correctly connected to the Tank/Return to allow proper operation of the Relief Valve.

---

9. Tighten all hose connections at both end.

10. Pull out on every STC fitting and confirm that it is firmly attached.

Figure 2-25 STC Hydraulic Connection Diagram



ORFS Hydraulic Hose Connection Procedure

1. Refer to the hose diagram in *Figure 2-24* and the instructions in the *O-Ring Face Seal (ORFS) Fitting Connectors* section on *page 29* for detailed information on connecting the hydraulic hoses.

Note: The hoses must be connected in the correct order for best fit and ease of installation. See the instructions in the *O-Ring Face Seal (ORFS) Fitting Connectors* section on *page 29* for the correct sequence.

---

2. Identify the four ports on the vehicle's Orbitrol. See *Table 2-4*.

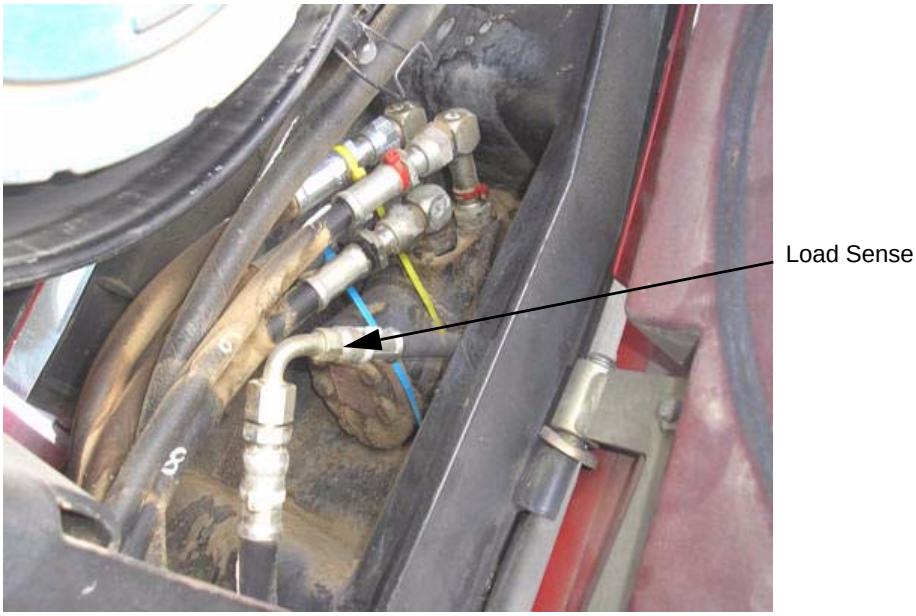
Table 2-4 Valve Ports and Functions

Port	Function
L =	Left
R=	Right
T =	Tank
LS =	Load Sense
P =	Pressure

3. Check if all the hoses on the steering unit are factory identified with the color cable ties as shown in *Figure 2-26*.

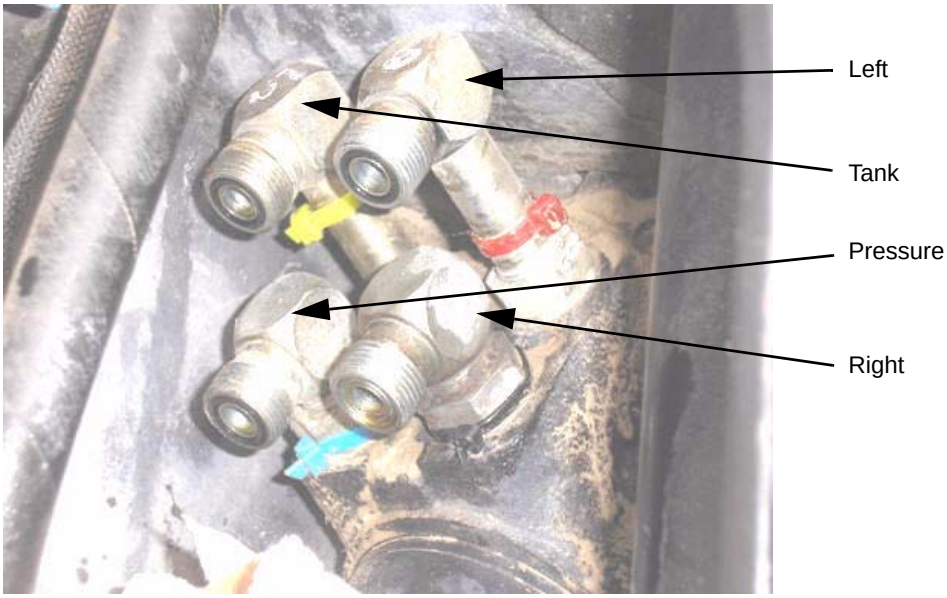
Note: The cable ties will enable correct hose connections upon assembly. If necessary, add colored cable ties to each hose and the corresponding hose adapter before disconnecting each hose. See *Figure 2-26*.

Figure 2-26 ORFS Orbitrol Cable Ties



4. Remove all four main hoses: P, T, R, and L (the LS hose can be disconnected later). See *Figure 2-27*.

Figure 2-27 Hydraulic Hoses Removed



Connect Hoses to Orbitrol and Steering Valve

Note: The hoses must be connected in the correct order for best fit and ease of installation.

1. Install a run tee on the Orbitrol's Pressure port. See *Figure 2-28*.
2. Connect the end of the pressure hose to the side of the run tee. See *Figure 2-28*.
3. Reconnect the vehicle pressure hose to the end of the run tee. See *Figure 2-28*.

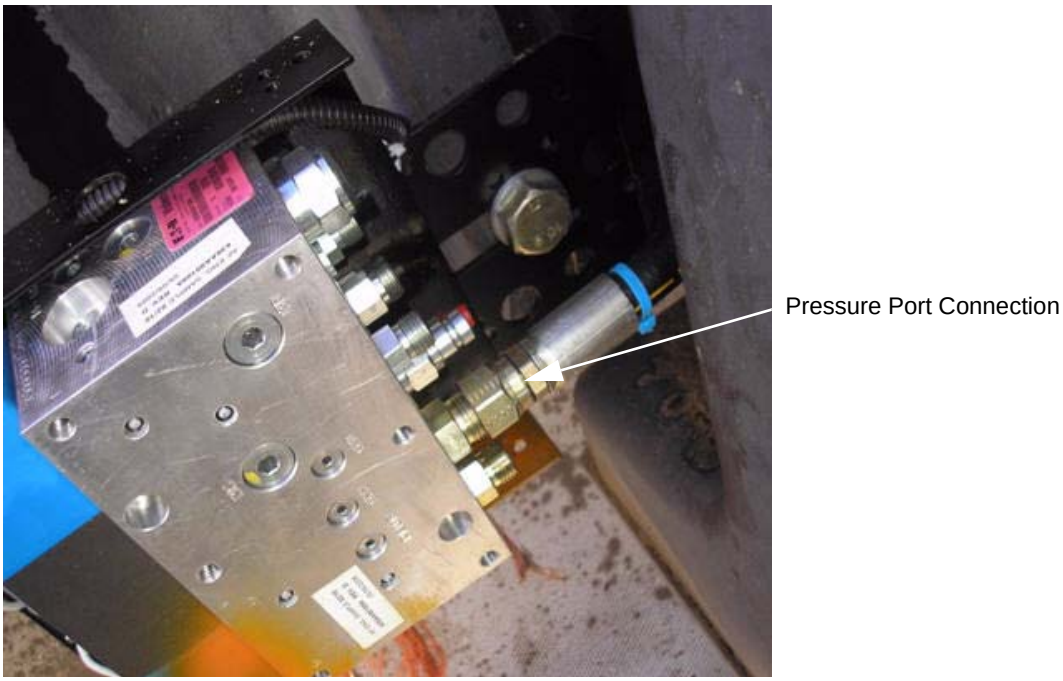
Figure 2-28 ORFS Orbitrol Pressure Port Connection

4. Tighten all the Pressure Port hydraulic hose fittings.

5. Connect the other end of the Pressure hose to the PRESS port on the Steering Valve. See *Figure 2-29*.

Note: Only hand tighten the hose fitting on the Steering Valve now. You may need to temporarily disconnect the fitting later in the procedure to make other hydraulic connections to the Steering Valve easier.

Figure 2-29 Steering Valve Pressure Port Connection



6. Install a run tee on the Orbitrol's Tank port. See *Figure 2-30*.
7. Connect the end of the Tank/Return hose to the side of the run tee. See *Figure 2-30*.
8. Reconnect the vehicle Tank/Return hose to the end of the run tee. See *Figure 2-30*.

Figure 2-30 ORFS Orbitrol Tank Port Connection

9. Tighten all the Orbitrol Tank Port hydraulic hose fittings.
10. Connect the other end of the hose to the Tank port on the Steering Valve.

Note: Only hand tighten the hose fitting on the Steering Valve now. You may need to temporarily disconnect the fitting later in the procedure to make other hydraulic connections to the Steering Valve easier.

---

11. Install a run tee on the Orbitrol's Right port. See *Figure 2-31*.

12. Connect the Right Steer hose to the side of the run tee. See *Figure 2-31*.

Figure 2-31 ORFS Orbitrol Right Port Connection

13. Reconnect the vehicle's Right Steer hose to the end of the run tee. See *Figure 2-32*.

Figure 2-32 ORFS Orbitrol Right Port Run Tee Connection

14. Connect the other end of the Right Steer hose to the RIGHT port on the Steering Valve.

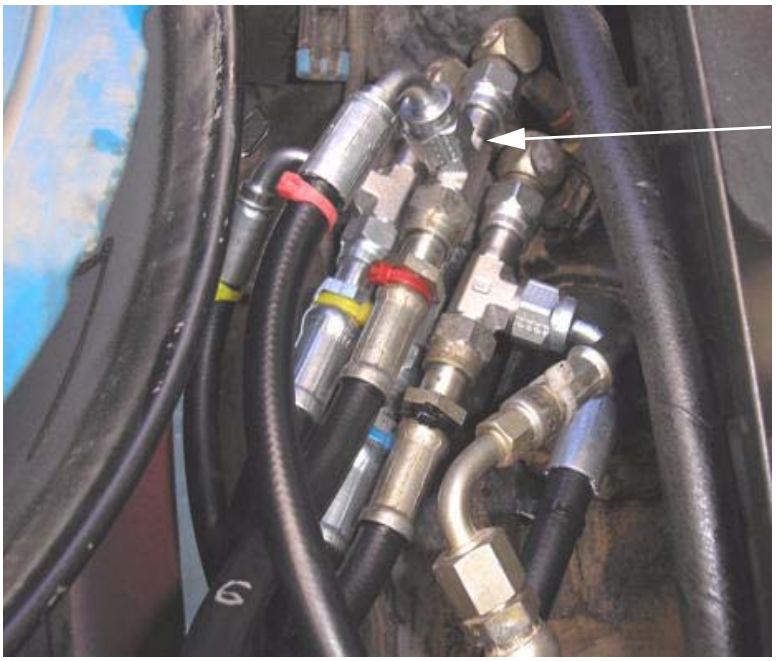
Note: Only hand tighten the hose fitting on the Steering Valve now. You may need to temporarily disconnect the fitting later in the procedure to make other hydraulic connections to the Steering Valve easier.

15. Install a run tee on the Orbitrol's Left port. See *Figure 2-33*.

16. Connect the Left Steer hose to the side of the run tee. See *Figure 2-33*.

17. Reconnect the vehicle's Left Steer hose to the end of the run tee. See *Figure 2-33*.

Figure 2-33 ORFS Orbitrol Left Port Connection

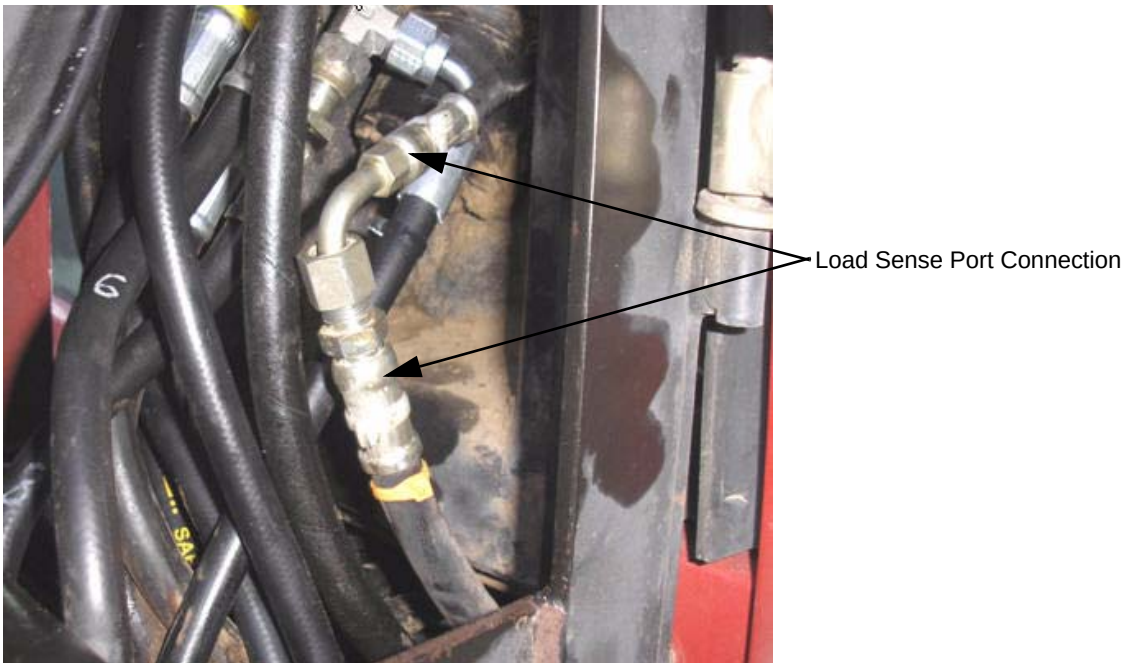


18. Connect the other end of the Steer hose to the LEFT port on the Steering Valve.

Note: Only hand tighten the hose fitting on the Steering Valve now. You may need to temporarily disconnect the fitting later in the procedure to make other hydraulic connections to the Steering Valve easier.

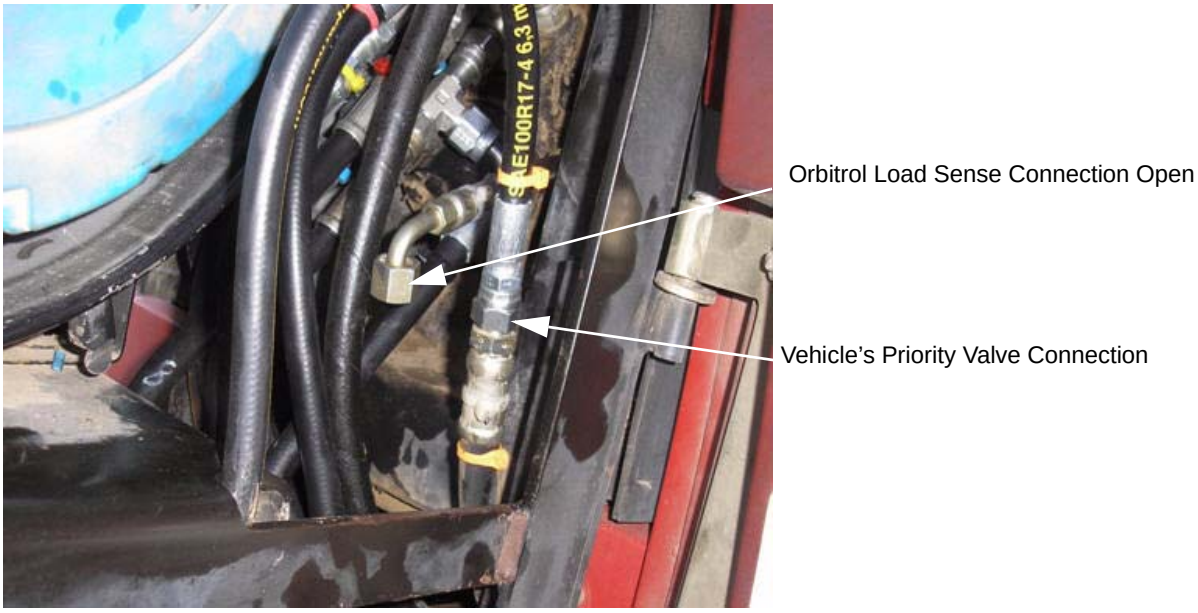
19. Locate the Load Sense hose that comes off the side of the Orbitrol. See *Figure 2-34*.

Figure 2-34 ORFS Orbitrol Load Sense Port Connection



20. Open the connection shown above between the short jumper hose that comes off the Orbitrol and the main Load Sense hose that goes towards the vehicle's Priority Valve. See *Figure 2-35*.

Figure 2-35 Orbitrol Load Sense Connection Open



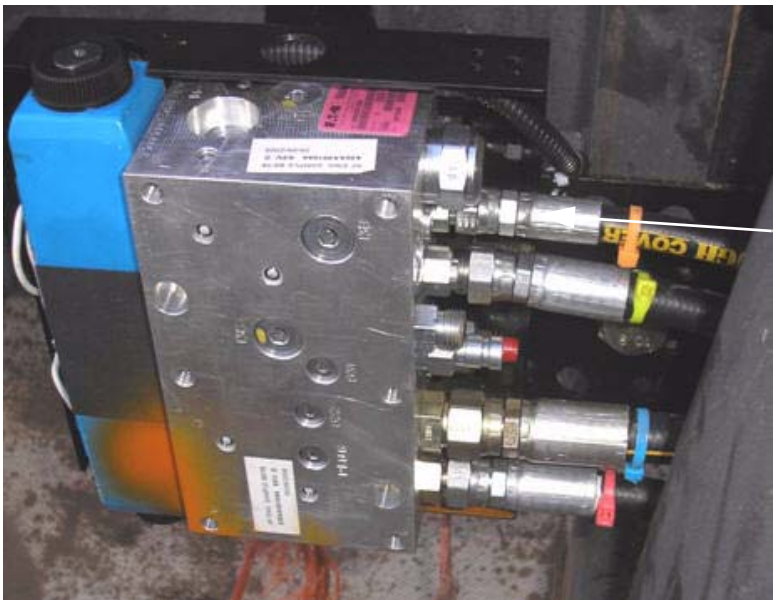
21. Connect the LS OUT hose to the end of the vehicle's main LS hose as shown in *Figure 2-34*.

Note: This LS hose will be used to stroke up the pump.

---

22. Connect the other end of the LS OUT hose to the LS OUT port on the Steering Valve as shown in *Figure 2-36*.

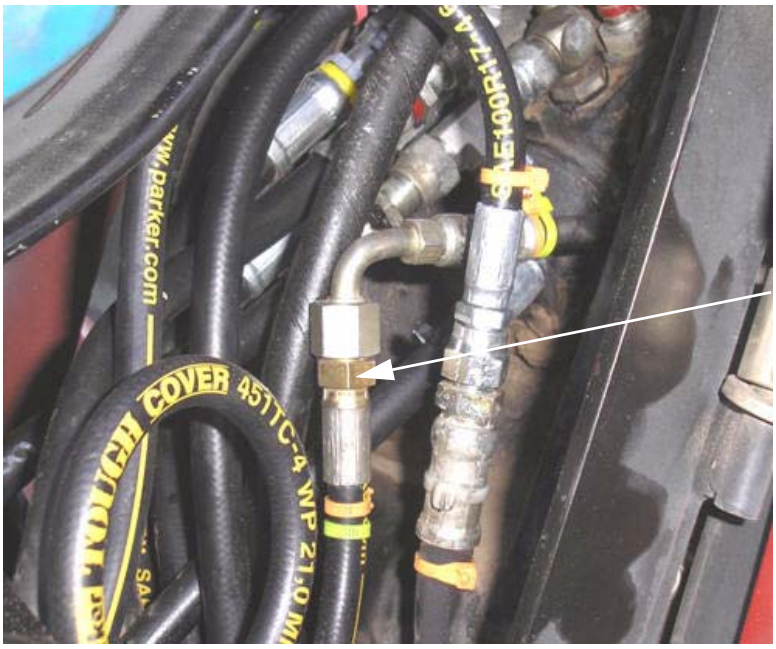
Figure 2-36 ORFS Steering Valve Load Sense Out Connection



23. Connect the Load Sense Orbitrol hose to the end of the short Load Sense jumper hose that comes off the side of the Orbitrol. See *Figure 2-37*.

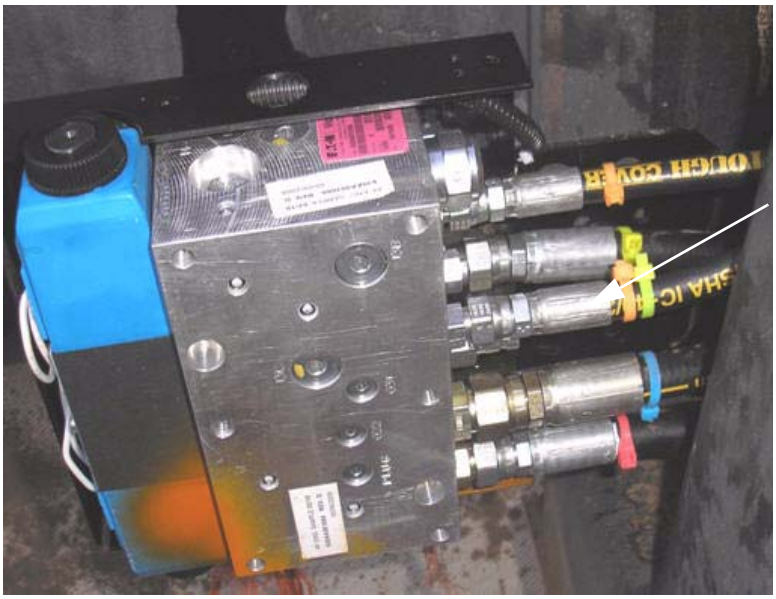
Note: This LS hose will maintain the functionality of the Orbitrol LS system and will provide a LS pressure signal for AutoSteer kick-out when the driver turns the steering wheel.

Figure 2-37 Load Sense Out Connection to Orbitrol



24. Connect the other end of the LS ORBITROL hose to the LS ORBITROL port on the Steering Valve as shown in *Figure 2-38*.

Figure 2-38 Steering Valve Load Sense Orbitrol Port Connection



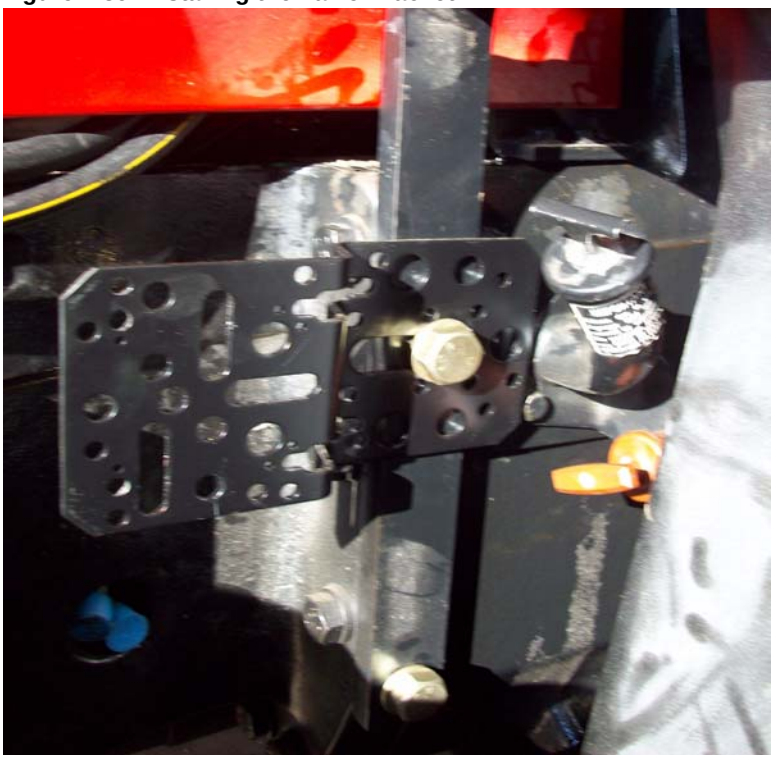
25. Secure hoses with cable ties in a protected position.

Alternate Hose Routing

Older MX vehicles have less room for routing hoses below the cab. It may be easier on these vehicle to mount the Steering Valve higher on the step and orient the Steering Valve so that the hoses exit the bottom of the Steering Valve.

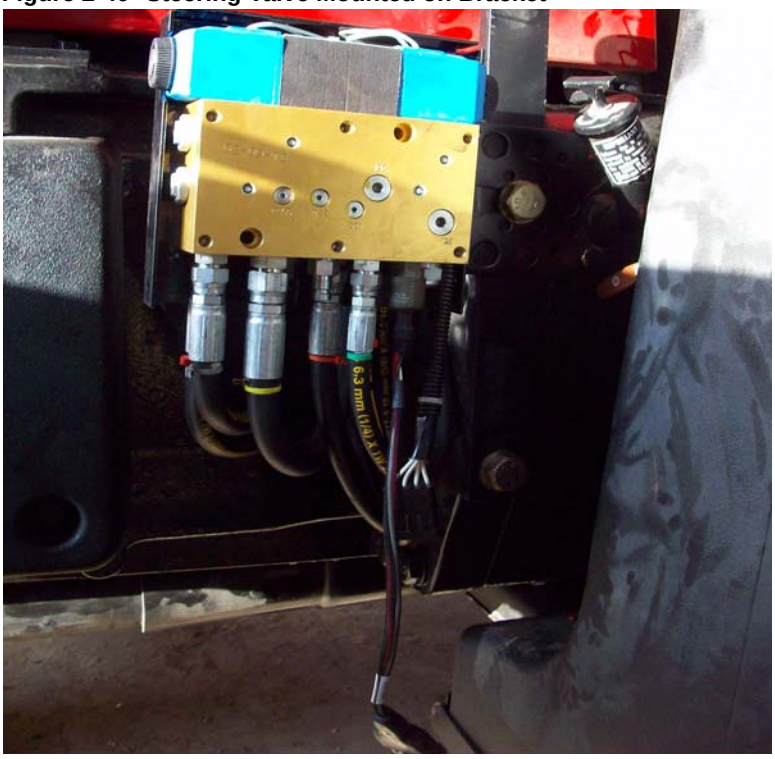
1. Install the “S” bracket in the position shown in *Figure 2-39*.

Figure 2-39 Installing the Valve Bracket



2. Secure the Steering Valve onto the bracket in the position shown in *Figure 2-40* using four 5/16” hex screws. Tighten the four screws using a 1/2” ratchet wrench.

Figure 2-40 Steering Valve Mounted on Bracket



3. Consider the steps in the *Hydraulic Hose Connection Procedures* section and then route the hoses as shown in *Figure 2-41*.

Figure 2-41 Alternate Hose Routing

Pressure Transducer Installation

1. Install the threaded Pressure Transducer into the port identified as “TRANS.” See *Figure 2-42*.
2. Tighten the Pressure Transducer using a 3/4” wrench. See *Figure 2-42*. Do not overtighten.

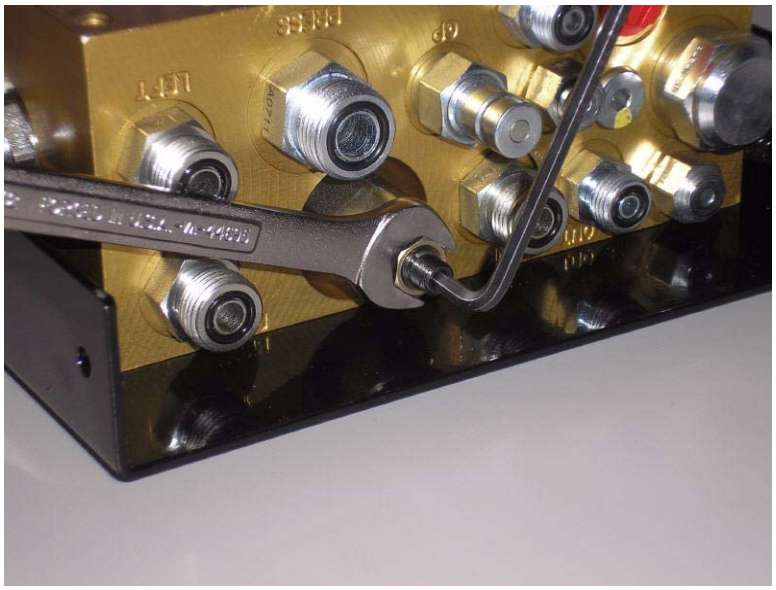
Figure 2-42 Pressure Transducer Installation

3. Connect the short transducer cable to the Pressure Transducer.

Adjusting the Relief Valve

The Steering Valve has a built-in Load Sense Relief Valve that limits the maximum pump pressure when using the AutoSteer system. The Relief Valve must be adjusted after you have completed the hydraulic installation and before you turn on the AutoSteer system. See *Figure 2-43*.

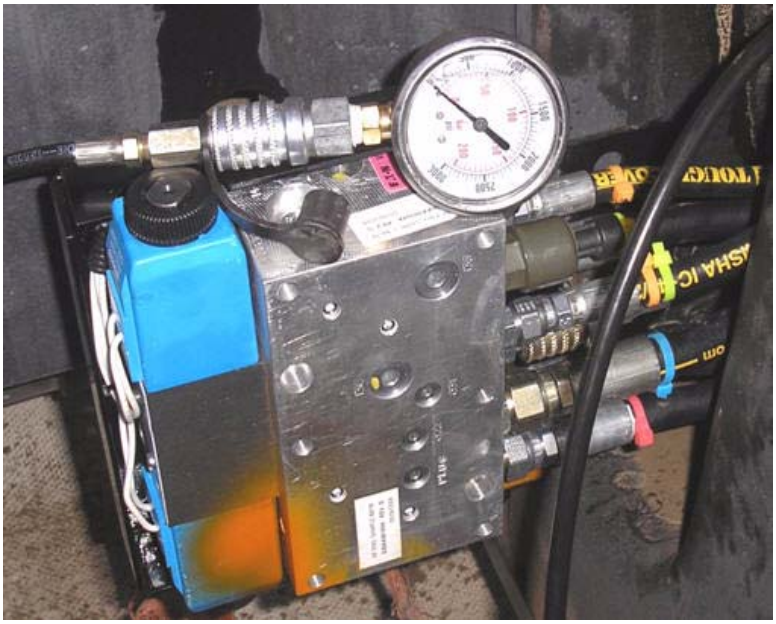
Figure 2-43 Relief Valve Adjustment



Note: When you adjust the Relief Valve, it is done with the Relief Valve mounted on the vehicle and the hydraulic hoses connected.

1. Install a 5000 psi pressure gauge on the Steering Valve diagnostics coupler labeled as GP. Use a short extension hose on the pressure gauge if necessary for easier reading. See *Figure 2-44*.

Figure 2-44 Pressure Gauge



2. Put transmission into “neutral” or “park” position and turn on the hand brake.
3. Start the engine and leave it at low idle.
4. Immediately check for oil leaks on all hose connections that were opened.
5. Turn the steering wheel full right and then full left and check for correct manuals steering response. Immediately check for oil leaks on all hose connections that were opened. Air in the hoses may cause a slight steering delay when the system is first powered up.
6. Observe the standby pump pressure shown on your pressure gauge. Standby pressure should be very low or around 350 psi. If standby pump pressure is zero or less than 100 psi, you might have inverted the Pressure and Tank hoses.
7. Clear any bystanders from around the vehicle because you will be moving the front wheels in the next step.
8. Press the 100% right or left button in the **Hydraulic Valve** window from the **Steering Components** window. The front wheels will turn quickly towards the stops. Maximum pump pressure will be indicated on the pressure gauge when the wheels hit the stops.
9. Adjust the Relief Valve so that the maximum pump pressure is 2800 psi when the wheels hit the stops.
10. Tighten the jam nut on the Relief Valve once the correct pressure setting has been adjusted.
11. Remove your pressure gauge by sliding the sleeve on the quick coupler.

Note: The objective of Load Sense Relief Valve adjustment is to establish a maximum AutoSteer pressure that is slightly higher than the maximum pressure obtained while steering the vehicle manually.

Steering Valve Installation Checklist

1. Valve bracket bolt is tight.
2. Mounting screws that secure the Steering Valve are tight.
3. Pressure hose is connected to correct port on Steering Valve and Orbitrol.
4. Tank hose connected to correct port on Steering Valve and Orbitrol.
5. LS-OUT hose connected to correct port on AF valve and LS hose on vehicle.
6. LS ORBITROL hose connected to correct ports at both ends.
7. Right Steer hose connected correctly at both ends.
8. Left Steer hose connected correctly at both ends.
9. Pressure Transducer installed and tight.
10. Checked that all hose fittings are tight.
11. Checked hose routing and cable ties on all hoses.
12. SA Module Harness connected to the two Steering Valve connectors.
13. 5000psi pressure gauge is installed on the Steering Valve test port.

Wheel Angle Sensor (WAS) Installation

This **Wheel Angle Sensor Installation** chapter information is provided in the following sections:

- *Installing Mounting Brackets*
  - *Case MX*
  - *New Holland TG*
- *Cut the Wheel Angle Sensor Rods to Length*
- *Assemble the Linkage Rod Hardware*
- *Attach the Wheel Angle Sensor Rods to Brackets and Adjust*

Note: The Wheel Angle Sensor is optional equipment and is not provided with the installation kit. The Wheel Angle Sensor installation instructions are provided for special installations, when required.

Installing Mounting Brackets

This section details the separate procedures for installing the Wheel Angle Sensor mounting brackets for the Case MX and New Holland TG vehicles series.

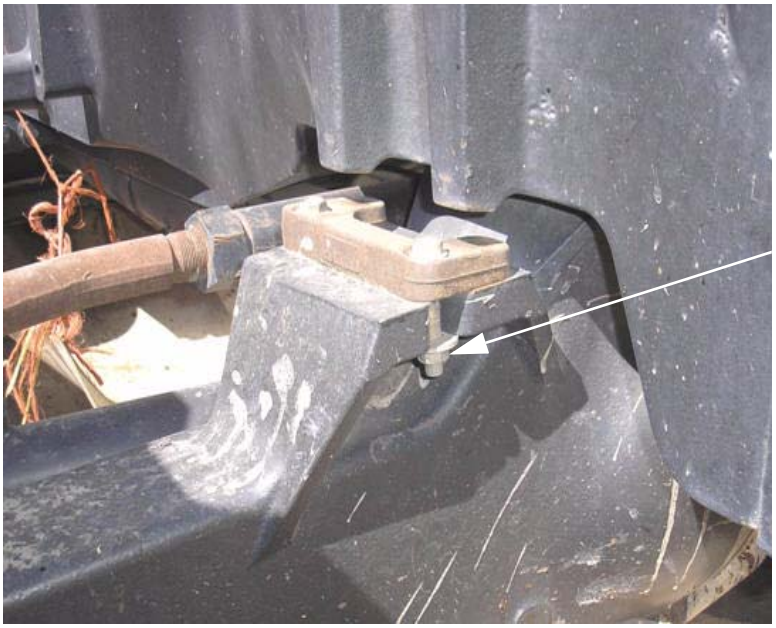
- *Case MX*
- *New Holland TG*

Case MX

1. Loosen the nut on the right side of the front axle as shown in *Figure 3-1*.

Note: This bolt will be used to secure the Wheel Angle Sensor bracket.

Figure 3-1 Front Axle Nut

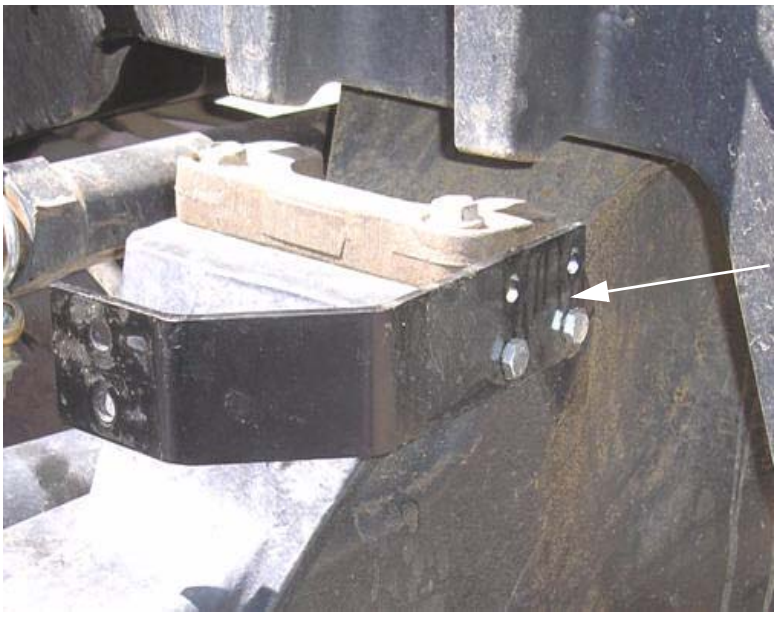


2. Secure the small bracket as shown above using the existing nut. See *Figure 3-2*.

Figure 3-2 Small Wheel Angle Sensor Bracket Installed

3. Install the larger bracket and secure to the small bracket using two hex screws and nuts. See *Figure 3-3*.

Figure 3-3 Large Wheel Angle Sensor Bracket Installed



4. Tighten the two nuts. The two screws can touch the front axle as shown above for added stability. See *Figure 3-4*.

Figure 3-4 Large Wheel Angle Sensor Bracket Bolts

5. Install the Wheel Angle Sensor on the bracket end, as shown in *Figure 3-5*.

Figure 3-5 Wheel Angle Sensor Installed on the Large Bracket

6. Install the “L” bracket on the right-side tie rod as shown in *Figure 3-6*. Secure to the tie rod using the U-bolt clamp provided in the kit.

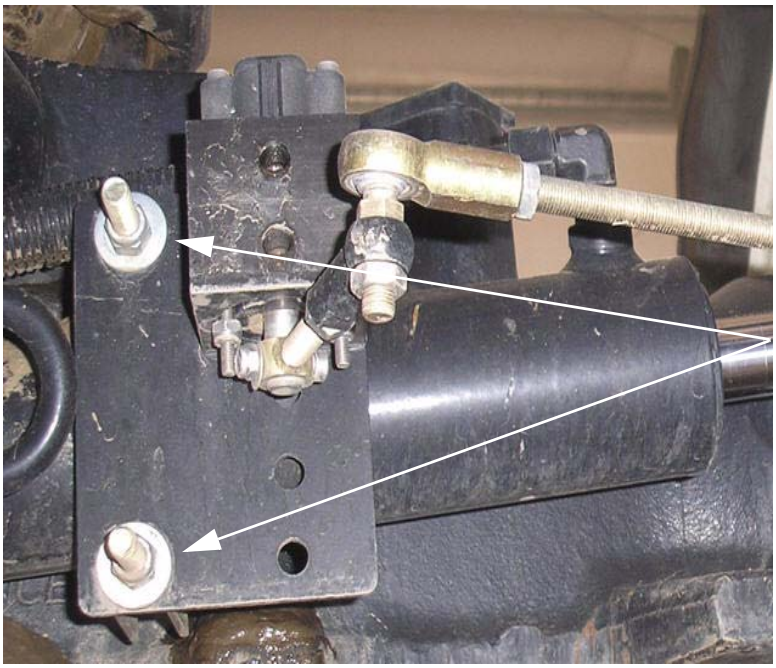
Figure 3-6 Wheel Angle Sensor “L” Bracket Mounted

New Holland TG

1. Install the Wheel Angle Sensor on the two top mounting holes of the flat bracket. See *Figure 3-7*.
2. Install the flat bracket on the right steering cylinder. Secure using the large clamp. See *Figure 3-7*.

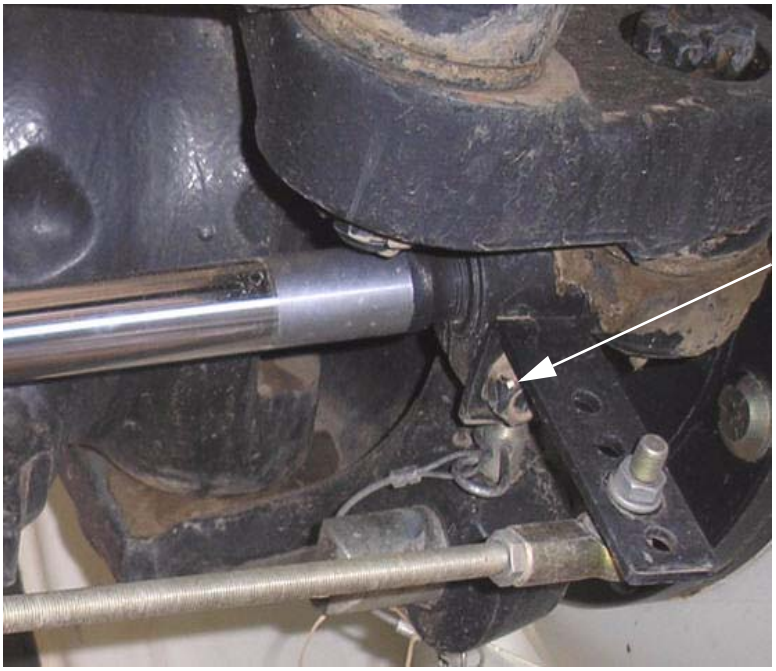
Note: *Figure 3-7* shows the sensor rods already attached. That procedure is detailed in the *Attach the Wheel Angle Sensor Rods to Brackets and Adjust* section.

Figure 3-7 Wheel Angle Sensor Bracket On Steering Cylinder



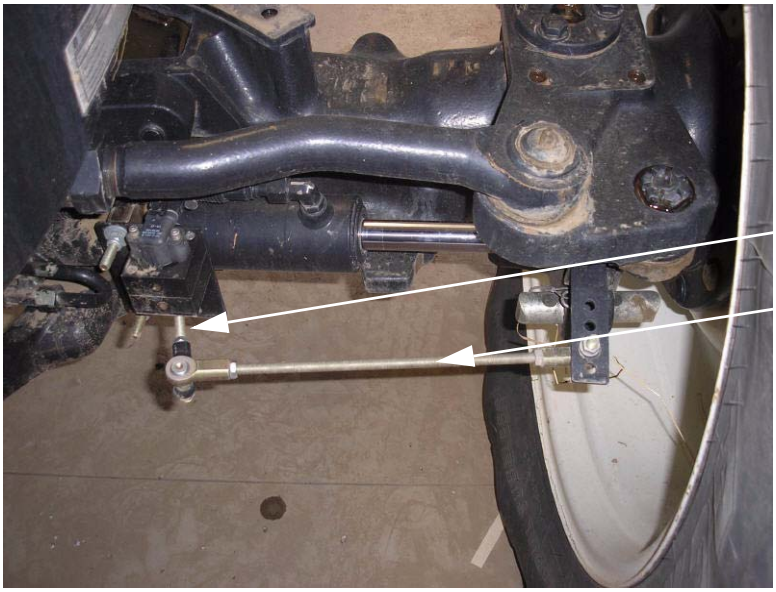
3. Mount the “L” bracket on the end of the tie rod as shown in *Figure 3-8*. Secure using the existing nut on the tie rod ball joint.

Figure 3-8 Wheel Angle Sensor “L” Bracket Installed



4. Loosely place the two linkage rods in the position shown in *Figure 3-9*.

Figure 3-9 Linkage Rod Positions



Cut the Wheel Angle Sensor Rods to Length

The Wheel Angle Sensor rods are shipped longer than they need to be. These rods must be cut to the proper length to allow the linkage rods to provide the Wheel Angle Sensor the maximum number of counts as the steering wheel is turned from full right to full left. Due to the variability of the possible mounting positions and axle options, it is left to the installer to verify the correct length for each individual installation and to cut the rods to length.

Table 3-1 provides the typical rod lengths that work for most installations. Before cutting the linkage rods to these measurements, verify that the Wheel Angle Sensor brackets can attach to the vehicle as shown in this manual and that they are attached the correct distance from any reference points shown. If the axle does not allow the Wheel Angle Sensor brackets to be installed as shown, do not cut the rods until it is determined what the proper lengths are for your installation. Due to possible variations in the mounting positions, these measurements could be different. These measurements are provided as a reference only. The installer is responsible for verifying that the provided measurements will work prior to cutting the rods.

Use a metal hack saw and vice, as show in *Figure 3-11*, to cut the Wheel Angle Sensor linkage rods to the proper lengths.

Note: It is advisable to attach a nut on the side of the metal rod that is going to be kept in order to clean the threads after the cut has been made.

Note: Clean-up the ends of the threaded rods using a file and check if the threads are good using a steel nut: the nut should engage smoothly on the threaded rod.

Table 3-1 shows the lengths for both sides. Protect the threads from damage while cutting the rods. *Figure 3-10* shows where the measurements provided in *Table 3-1* are measured from.

Figure 3-10 Linkage Rod Cut Length Measurement Points

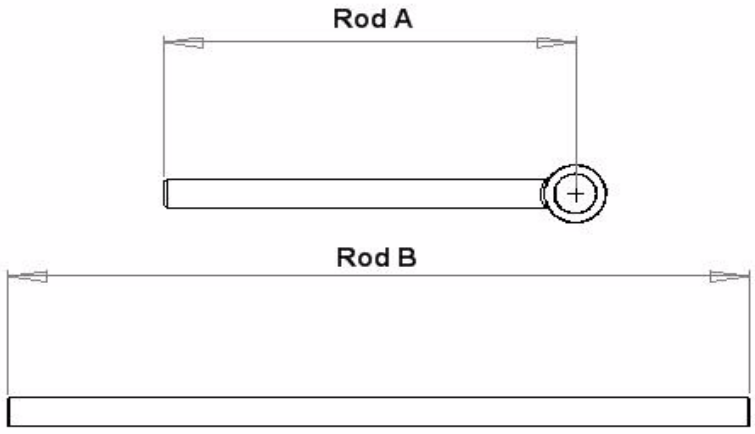
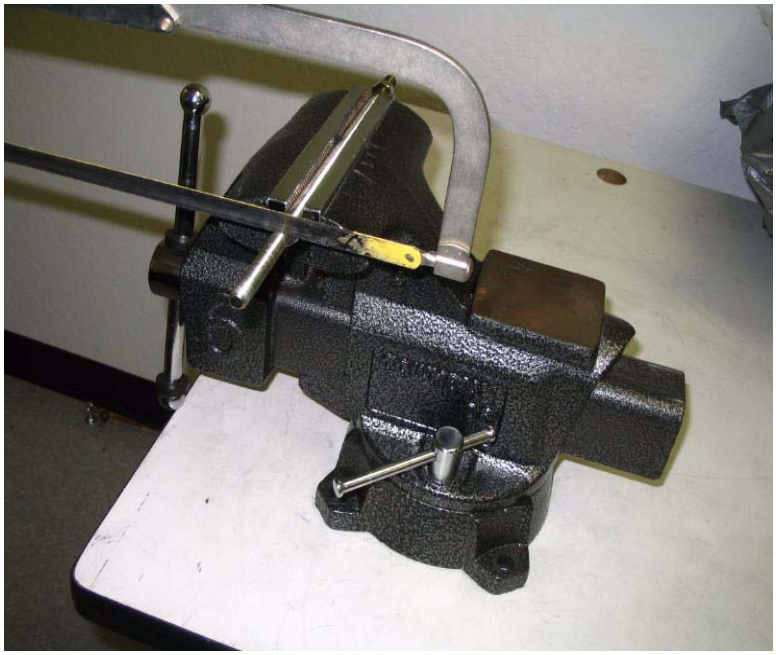


Table 3-1 Linkage Rod Cut Lengths

Item	Length[a]	
	Case MX	New Holland TG
Rod A	3.5 inches (89 mm)	2.4 inches (61 mm)
Rod B	9.25 inches (235 mm)	11.5 inches (292 mm)

a. This measurement is the linkage rod length prior to assembly with the ball joints.

Figure 3-11 Linkage Rod Cutting



Note: The “after-assembly” center-to-center lengths of each linkage rod are shown in *Table 3-2*. *Figure 3-12* shows the measurement points for the assembled linkage rods.

Assemble the Linkage Rod Hardware

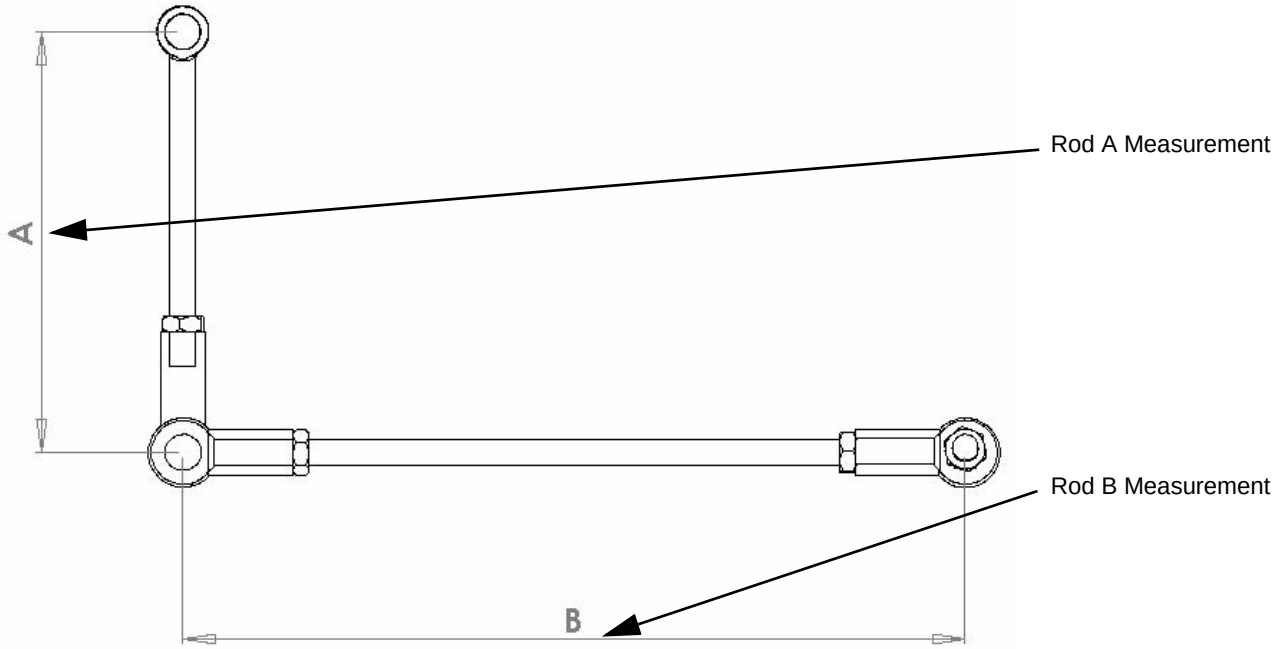
For most installations, use *Table 3-2* to adjust the lengths of the rod assemblies to the values shown. *Figure 3-12* shows where the measurement points for each rod are taken. Due to the variation of axle types and installation points, these measurements are provided as a reference only. Before connecting the steering rods and turning the steering axle verify that these lengths will work and the sensor will not be damaged.

Table 3-2 Assembled Linkage Rod Lengths

Item	Length[a]	
	Case MX	New Holland TG
Rod A	4.5 inches (115 mm)	3.4 inches (87 mm)
Rod B	11.25 inches (286 mm)	13.5 inches (343 mm)

a. This measurement is the linkage rod length after assembly with the ball joints.

Figure 3-12 Linkage Rod Measurement Points (Assembled)

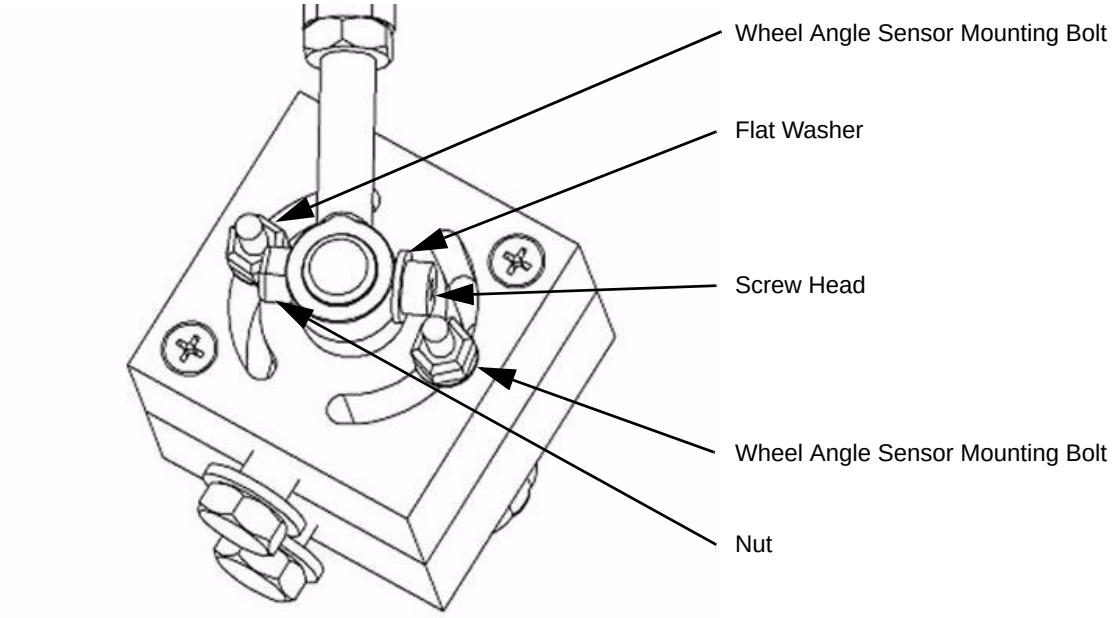


Note: The threaded rods must be cut to the correct lengths before final assembly.

Attach the Wheel Angle Sensor Rods to Brackets and Adjust

1. Install Linkage Rod **A** on the Wheel Angle Sensor shaft.
2. Install Linkage Rod **B** on the sensor bracket using a ball joint.
3. Ensure a flat washer is placed under the screw head when attaching the linkage rod to the sensor shaft. See *Figure 3-13*.

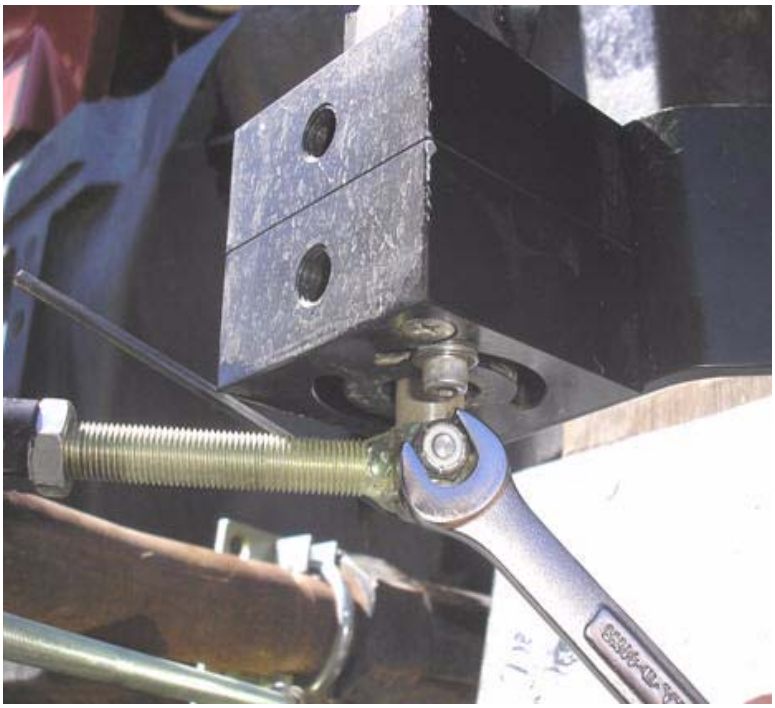
Figure 3-13 Washer on Shaft Screw



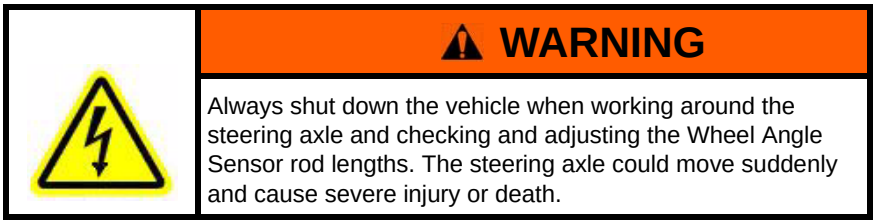
Note: The washer should be on the bolt head side and not the nut side of the assembly.

4. Tighten the screw on the sensor shaft. Use a 1/8” hex key and a 3/8” wrench. See *Figure 3-14*.

Figure 3-14 Wheel Angle Sensor Shaft Tightening



5. Tighten all jam nuts on the threaded rods.

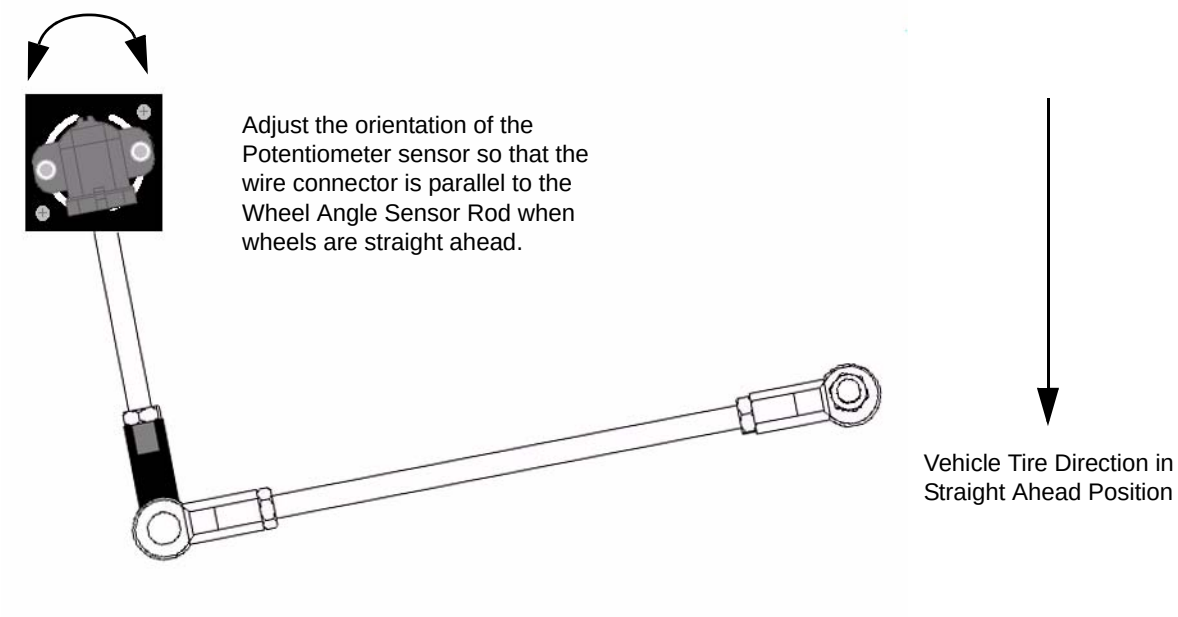

WARNING
Always shut down the vehicle when working around the steering axle and checking and adjusting the Wheel Angle Sensor rod lengths. The steering axle could move suddenly and cause severe injury or death.

Note: Never attach the linkage rods to Wheel Angle Sensor rod and turn the steering wheels manually or automatically until the fit has been verified. The linkage rods must remain apart while the steering wheels are turned to the maximum right and left positions and then temporarily attached at these positions. Failure to do this may cause the Wheel Angle Sensor or vehicle to become damaged.

Note: After the linkage rods are assembled in the following steps, they should move freely without touching any other parts and without overextending. Make any necessary adjustments to the linkage rods if there is an interference problem.

6. With the linkage rods disconnected, manually turn the steering wheel so that the wheels are centered (the vehicle will travel straight ahead when moving).
7. Temporarily attach the linkage rods.
8. Rotate the Wheel Angle Sensor potentiometer on top of the mounting block so that the plastic wire connector is parallel to the Wheel Angle Sensor rod. See *Figure 3-15*.

Figure 3-15 Adjust Potentiometer Angle to Match Straight Ahead


Adjust the orientation of the Potentiometer sensor so that the wire connector is parallel to the Wheel Angle Sensor Rod when wheels are straight ahead.
Vehicle Tire Direction in Straight Ahead Position

9. After the potentiometer has been adjusted, tighten the potentiometer bolts with a 5/32” hex key and a 3/8” wrench. See *Figure 3-16*.

Figure 3-16 Wheel Angle Sensor Potentiometer

10. Disconnect the linkage rods and turn the steering wheel manually to the full left position.

11. Reattach the linkage assembly and verify that the sensor or rods will not be damaged. Adjust the rod lengths as necessary.

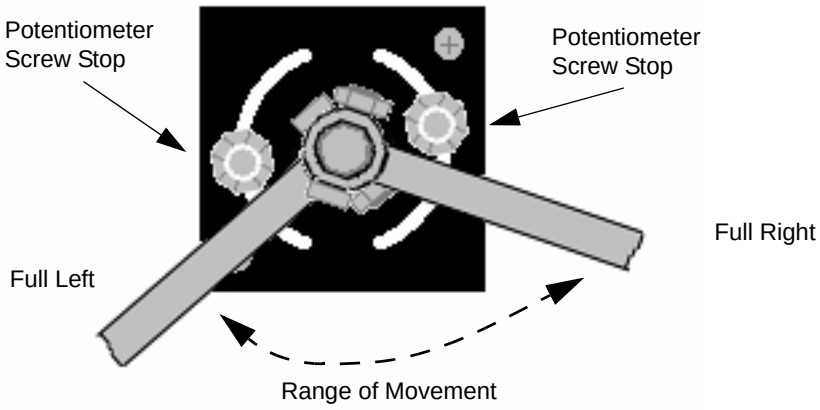
12. Disconnect the linkage rods and turn the steering wheel manually to the full right position.

13. Reattach the linkage assembly and verify that the sensor will not be damaged. Adjust the rod lengths as necessary.

14. Repeat *Step 6* through *Step 13* until the rod lengths have been adjusted and the potentiometer is centered to get the maximum sensor movement. The maximum movement is reached when the Wheel Angle Sensor rod will sweep from approximately 3/16 inch (5mm) from both bolt heads holding the potentiometer on to the block when the wheels are turned to the maximum right and left positions. See *Figure 3-17*.

Figure 3-17 Maximum Sensor Movement

Wheel Angle Sensor as Seen from the Bottom



Note: An Ohm meter can also be used to determine if there is enough sensor movement. Connect the Ohm meter to pins A and B of the Wheel Angle Sensor. Measure the Ohm reading at the maximum left and right position. After subtracting the smaller number from the larger number, there should be at least a 3.75 kilohms change. The reading should also never go below 1.6 or higher than 6.6 kilohms as this is reaching the limits of the potentiometer and could damage the sensor.

15. Once all the adjustments are complete, tighten all lock nuts and bolts on the linkage and Wheel Angle Sensor rod. A 1/2” and two 9/16” wrenches are required to tighten all the connections.

16. Tighten the bolt securing the two linkage rods together. See *Figure 3-18*.

Figure 3-18 Linkage Rod Ball Joint Bolt

17. *Figure 3-19* (Case MX) and *Figure 3-20* (New Holland TG) show the completed Wheel Angle Sensor installation.

Figure 3-19 Wheel Angle Sensor Assembly Installed (Case MX)

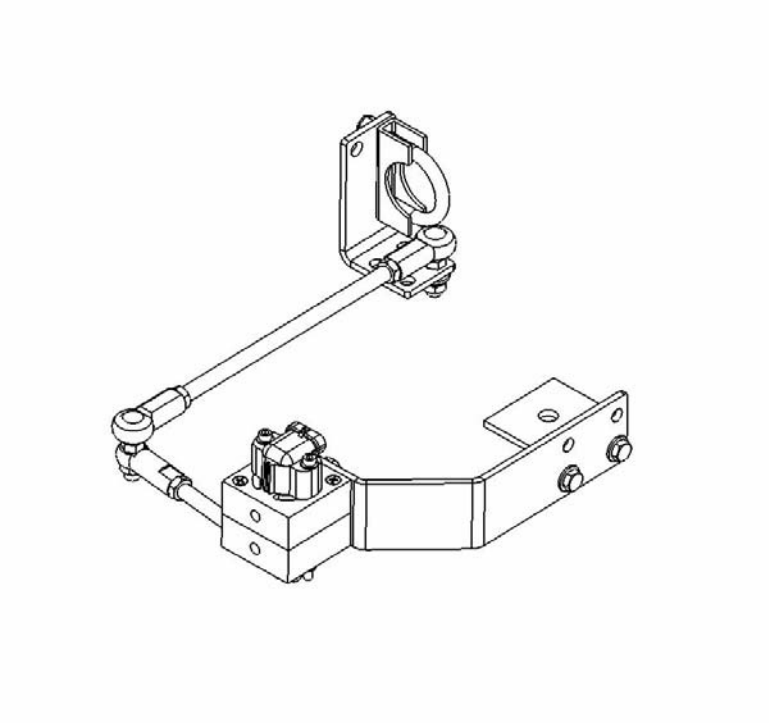
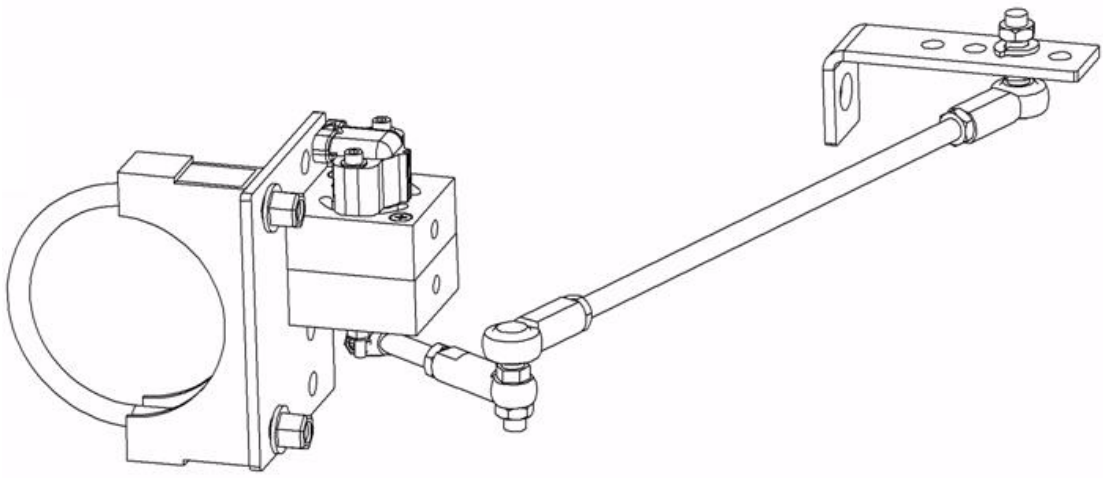


Figure 3-20 Wheel Angle Sensor Assembly Installed (New Holland TG)



SA Module Installation

The **SA Module Installation** chapter contains information in the following sections:

- *SA Module Mounting Orientation*
- *Mount the SA Module*
  - *Preferred Location*
  - *Alternate Location*

SA Module Mounting Orientation

The SA Module can also only be mounted in certain orientations. *Figure 4-1* shows the correct mounting positions.

Figure 4-1 Correct SA Module Mounting Orientations

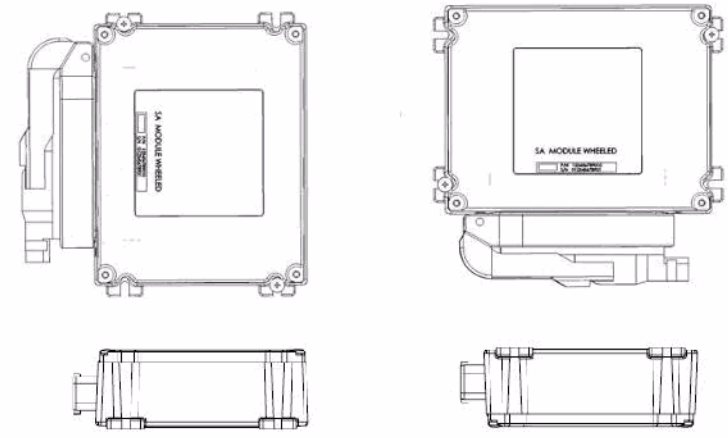
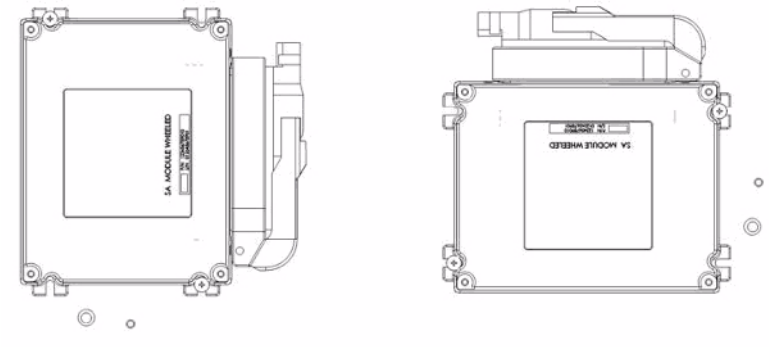


Figure 4-2 shows incorrect mounting positions.

Figure 4-2 Incorrect SA Module Mounting Orientations



Mount the SA Module

The mounting procedures are contained in the following sub-sections:

- *Preferred Location*
- *Alternate Location*

Due to the variety of options available on vehicles and the possible configuration differences, it may be necessary to install the SA Module in location other than the examples shown here. If an alternative location is required, choose a location where the SA Module can be protected from damage from moving parts or crop debris and excessive moisture from weather and cleaning equipment.

Note: If your kit includes a SAM Harness with a longer Steering Valve cable (PN: 201-0371-02), you may install the SA Module on the rear of the vehicle and run the Steering Valve cable under the cab towards the Steering Valve.

Note: The SA Module Harness must be routed in a protected position to avoid damage from the moving parts.

Preferred Location

1. Locate a mounting hole of the left step bracket. See *Figure 4-3*.

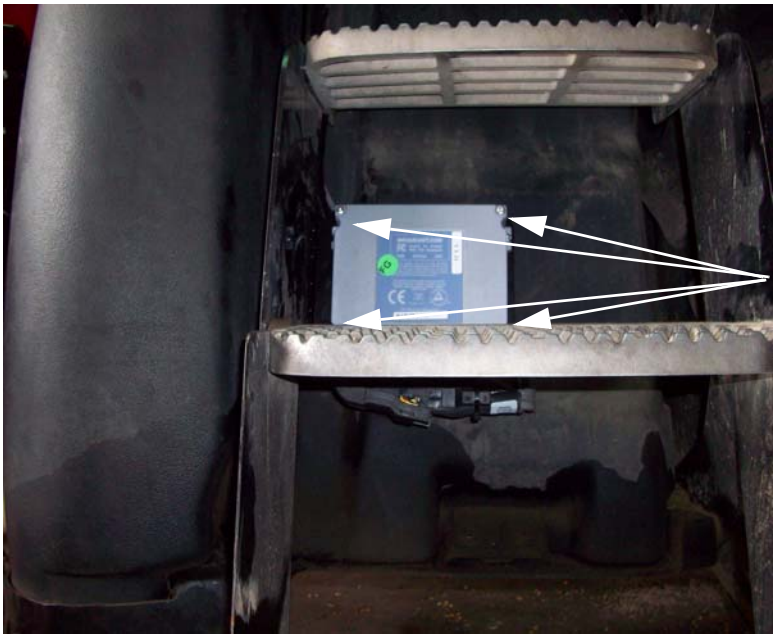
Figure 4-3 SA Module Mounting Location

2. Mount the SA Module bracket in the position shown in *Figure 4-4*. Use a hex bolt and nut to secure the bracket.

Figure 4-4 SA Module Mounting Bracket Installed

3. Mount the SA Module on the bracket with the connector facing down. See *Figure 4-5*.
4. Secure the SA Module to the bracket using four Phillips screws. See *Figure 4-5*.

Figure 4-5 SA Module Installed on Bracket



Alternate Location

1. Locate a mounting hole of the left step bracket. See *Figure 4-6*.

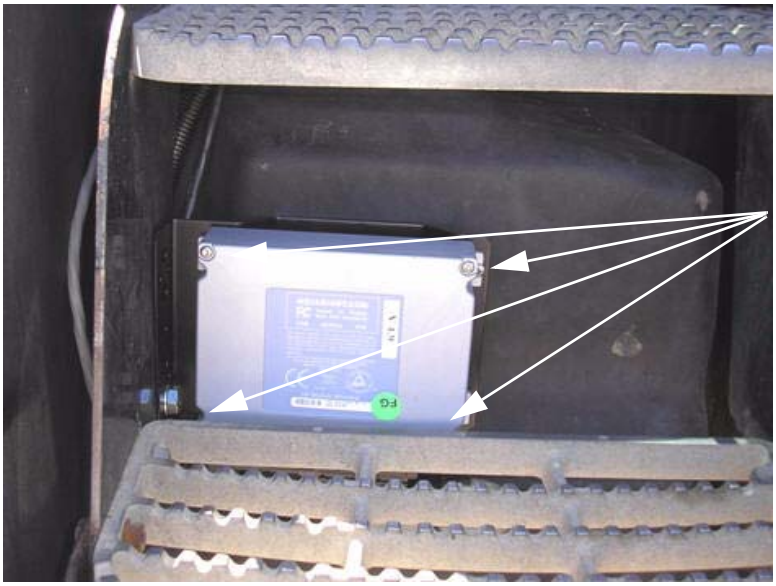
Figure 4-6 SA Module Mounting Location

2. Mount the SA Module bracket in the position shown in *Figure 4-7*. Use a hex bolt and nut to secure the bracket.

Figure 4-7 SA Module Mounting Bracket Installed

3. Mount the SA Module on the bracket with the connector facing down. See *Figure 4-8*.
4. Secure the SA Module to the bracket using four Phillips screws. See *Figure 4-8*.

Figure 4-8 SA Module Installed on Bracket



Roof Module Installation

This **Roof Module Installation** chapter contains information in the following sections:

- *Safety Notes*
- *Roof Rail Installation*

Safety Notes

- The steering system must be powered OFF when installing or removing the Roof Module.
- The supplied locking pin must be in place whenever the vehicle is in operation.
- The Roof Module must be removed when transporting the vehicle at speeds above 30 mph (50 km/h).
- Ensure you are in a stable position on the vehicle platform when removing the Roof Module, so that you do not fall or drop the Roof Module.
- Use a ladder to install the Roof Rail Brackets.

WARNING
Ensure that you are in a stable position on the vehicle when installing or removing the Roof Rail and Roof Module so you do not fall.

Roof Rail Installation

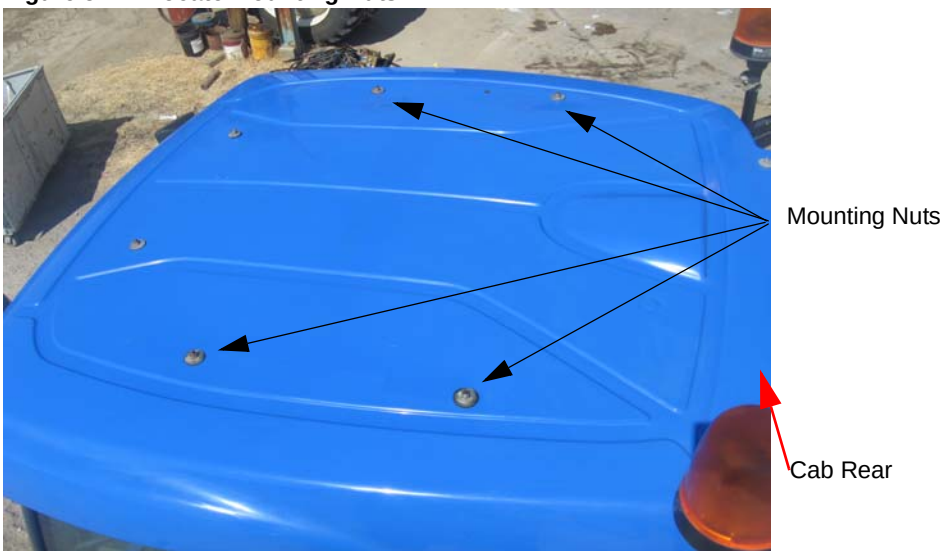
1. Place the ladder as close as possible to the side of the cab.

Note: The ladder is necessary to install the Roof Rail and Roof Module.

---

2. Remove the four mounting nuts from the cab roof: two from the right and two from the left. See *Figure 5-1*.

Figure 5-1 Locate Mounting Nuts



3. Use the existing nuts to attach the two Roof Rail Brackets as shown in *Figure 5-2* (two nuts per bracket).

Figure 5-2 Attach Roof Rail Brackets

4. Center the Roof Rail on the cab roof.

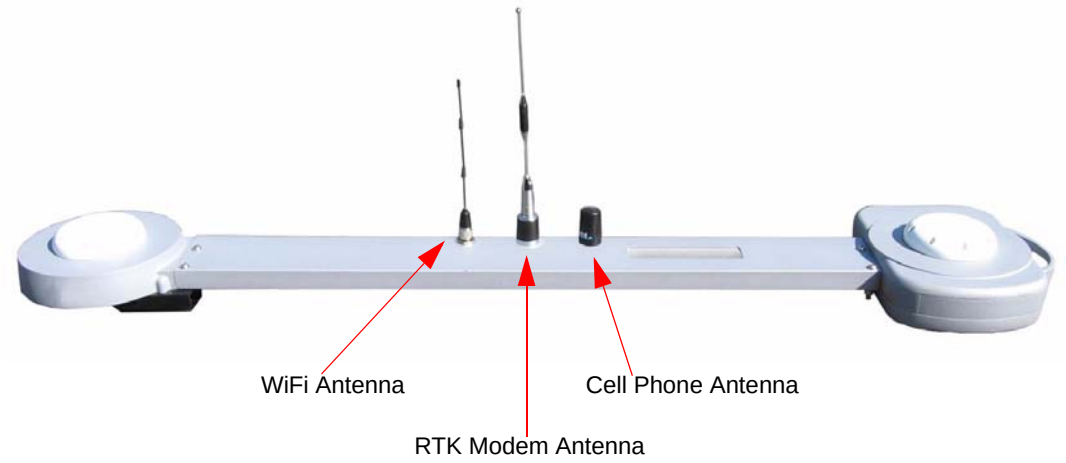
5. Attach the Roof Rail using the bolts, nuts and washers supplied. Tighten securely with a 15/16” socket and ratchet and a 15/16” open wrench. See *Figure 5-3*.

Figure 5-3 Roof Rail Installed

6. Attach the three antennas to the proper Roof Module antenna connections. See *Figure 5-4*.

Note: Hand tighten the connections. Do not over tighten.

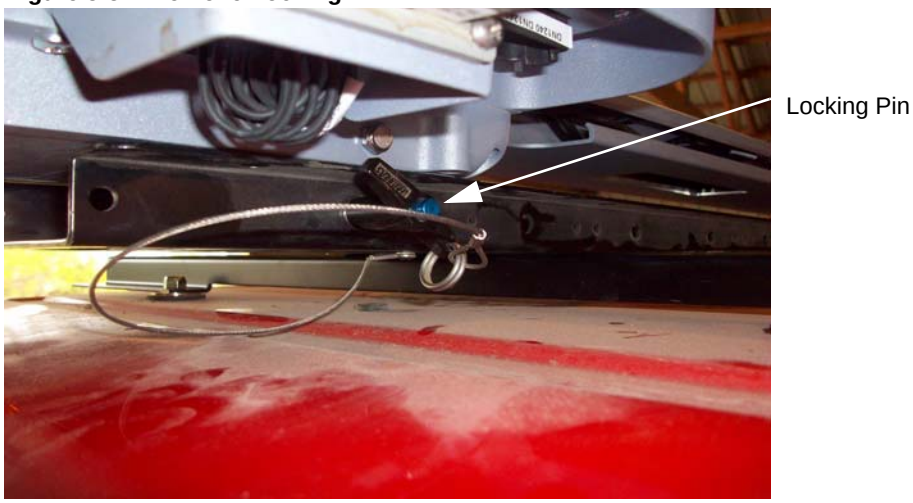
Figure 5-4 Attach the Antennas



7. Remove the Locking Pin from the Roof Rail. See *Figure 5-5*.

Note: *Figure 5-5* shows the Roof Module already attached to the Roof Rail.

Figure 5-5 Remove Locking Pin



8. Place the Roof Module on the Roof Rail. See *Figure 5-6*.

Figure 5-6 Attach Roof Module

9. Reinsert the Locking Pin into the Roof Rail. See *Figure 5-5*.

Note: The Locking Pin can be inserted from either side of the Roof Rail.

10. The completed Roof Module should appear as shown in *Figure 5-6*.

Display Installation

This **Display Installation** chapter contains following Display information:

- *Introduction*
- *Installation Procedure*

Introduction

This chapter provides the instructions for installing the RAM Mount Ball in the cab so the Display can be attached later. Refer to your Display user manual for instructions on installing the Display.

Installation Procedure

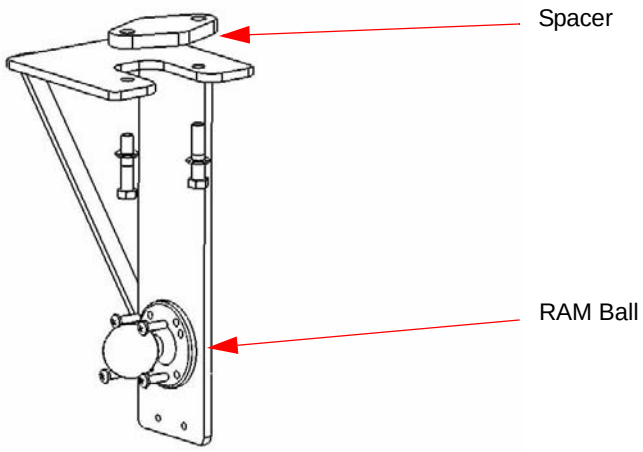
1. Locate the two screws on the right side of the cab and remove them. See *Figure 6-1*.
2. Install the Display bracket as shown in *Figure 6-1* and secure the bracket to the roof using the two longer hex screws provided in the kit.

Note: Alternative mounting locations can be used if the location shown is not available.

Figure 6-1 Secure Display Bracket

3. If the cab does not have a steel bar bracket, insert the supplied spacer between the Display bracket and the cab roof as shown in *Figure 6-2*.

Figure 6-2 Display Bracket with RAM Ball



4. Mount the RAM Base Ball to the Display bracket and secure using four screws and nuts. *Figure 6-2* shows the completed installation.

Note: Refer to the Display user manual for the remaining Display-specific installation instructions.

Connecting System Cables

This **Connecting System Cables** chapter provides information for connecting the Main Cable Harness and the SA Module Harness to the various vehicle and steering system components in the following sections:

- *SA Module Harness*
  - *SA Module Connection*
  - *Wheel Angle Sensor Connection*
  - *Steering Valve Connection*
- *Main Cable Harness*
  - *Roof Module*
  - *Main Cable Harness Connections Inside Cab*
  - *SA Module Harness*
- *Power Supply Connection*
  - *Cab Power Connection*
  - *Battery Power Connection*

SA Module Harness

This **SA Module Harness** section contains the following sub-sections:

- *SA Module Connection*
- *Wheel Angle Sensor Connection*
- *Steering Valve Connection*

SA Module Connection

1. The rear cab cover must be removed to enable the routing of the SA Module Harness under the cover. See *Figure 7-1*.

Figure 7-1 Rear Cab Cover

Note: The cover is secured to the vehicle by two hex screws on each side.

2. Loosen the two hex screws on the side of each rear mud guard. See *Figure 7-2*.

Note: There are four hex screws on each side, but only two secure the rear cover on each side.

Figure 7-2 Cab Rear Mud Guard Bolts

3. Pull the rear cover backwards until it is released from the vehicle when the screws are loose. See *Figure 7-3*.

Figure 7-3 Cab Rear Cover Removal

Note: The rear cover is made from plastic material and must be handled with care.

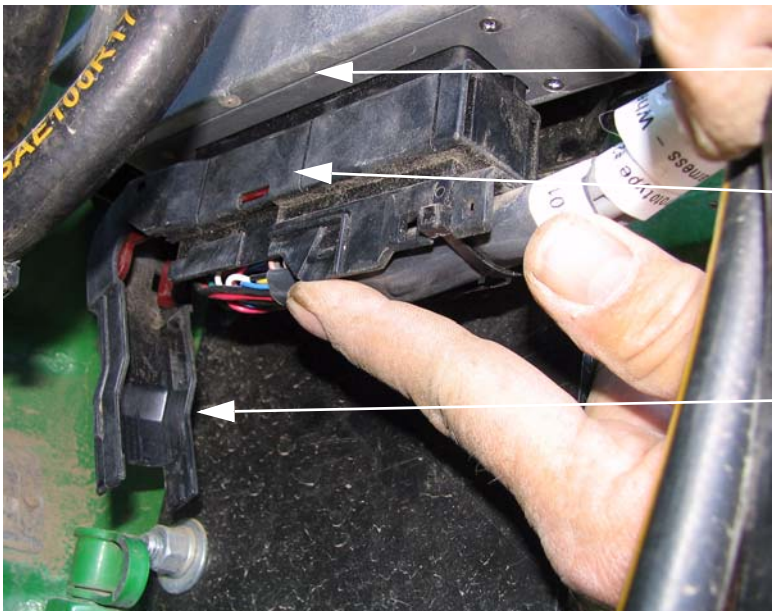
4. Clean the cover and the area under the cover that is normally soiled with dirt and crop residue.

Note: Cleaning the cover makes it easier to route the SA Module Harness and also makes it easier to reinstall the cover.

---

5. Connect the SA Module Harness to the SA Module. See *Figure 7-4*.

Figure 7-4 Connecting SA Module Connector (different vehicle shown)



6. Close the cable connector locking mechanism as shown in *Figure 7-5*.

Figure 7-5 SA Module Connector (closed).

7. Route the SA Module Harness under the cab left side towards the vehicle rear. See *Figure 7-6*.
8. Secure with cable ties along a safe position under the cab to avoid contact with the rear tire. See *Figure 7-6*.

Figure 7-6 Routing the SA Module Harness

9. Secure the end of the SA Module Harness at the back of the vehicle using a cable tie.
10. Route the SA Module Harness under the cab left side towards the vehicle rear. See *Figure 7-7*.

Note: The three connectors shown in *Figure 7-7* connect to the Main Cable Harness and optional remote engage switch.

Figure 7-7 SA Module Harness Connector Under Cab

Wheel Angle Sensor Connection

Note: This connection to the Wheel Angle Sensor is only required when using the AutoSteer Wheel Angle Sensor.

1. Press the rubber button on the front grille to open the engine hood latch. See *Figure 7-8*.

Figure 7-8 Engine Hood Latch Button

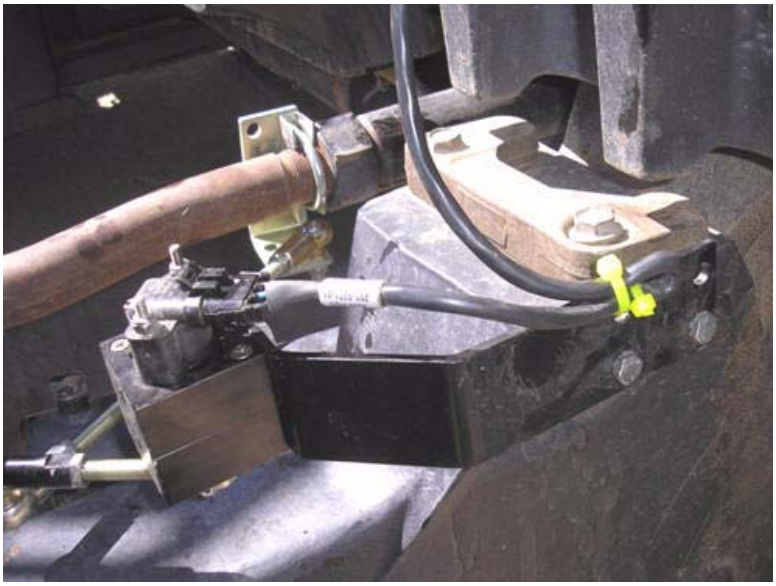
2. Open the engine hood to route the SA Module Harness towards the Wheel Angle Sensor. See *Figure 7-9*.
3. Route the SA Module Harness around the front of the vehicle passing between the radiators. See *Figure 7-9*.

Note: Do not route the SA Module Harness close to belts, fans, exhaust, turbo components, or moving parts.

Figure 7-9 Engine Compartment SA Module Harness Routing

4. Secure the SA Module Harness with cable ties at regular intervals along the whole length.
5. Once the SA Module Harness has been installed, secure the Wheel Angle Sensor cable along the bracket top using cable ties. See *Figure 7-10*.

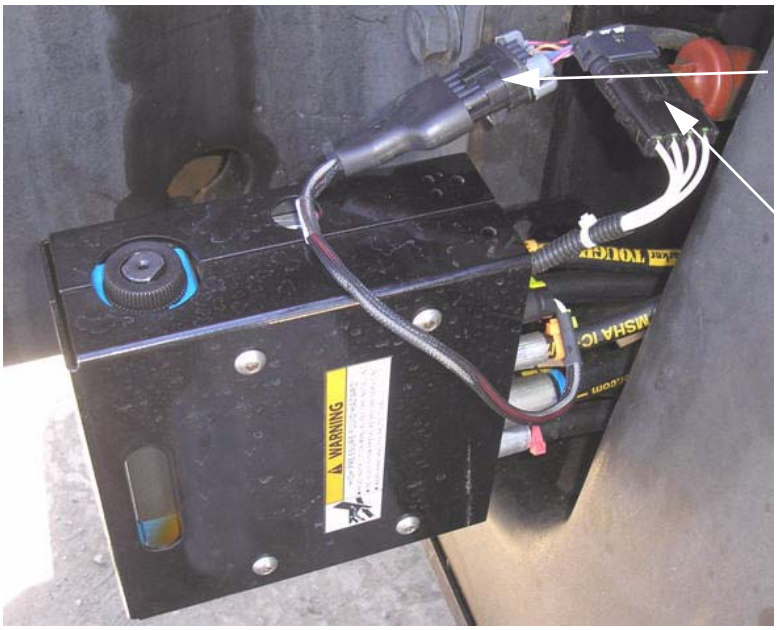
Figure 7-10 SA Module Harness Wire Ties



Steering Valve Connection

1. Connect the Steering Valve's 4-pin connector and 10-pin connector to the SA Module Harness. See *Figure 7-11*.

Figure 7-11 Steering Valve Connectors



2. Secure cables with cable ties in a protected position.

Main Cable Harness

This **Main Cable Harness** section contains the following sub-sections:

- *Roof Module*
- *Main Cable Harness Connections Inside Cab*
- *SA Module Harness*

Roof Module

1. Route the cable out the rear of the cab window through the rubber panel in the lower right corner of the rear window and secure with cable ties. See *Figure 7-12*.

Figure 7-12 Main Cable Harness Exiting the Vehicle Cab

2. Route the cable down the left side of the cab and secure with cable ties. See *Figure 7-13* and *Figure 7-14*.

Figure 7-13 Routing Roof Module Main Cable Harness on the Cab

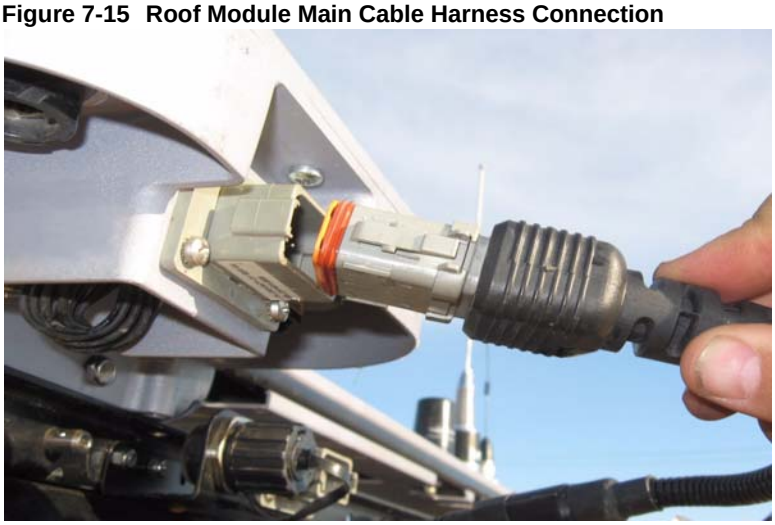
Figure 7-14 Routing Roof Module Main Cable Harness

3. Attach the cable to the Roof Module. See *Figure 7-15*.

   Orient the 12-pin connector so the word “TOP” on the cable connector is pointing upwards (towards the sky). Insert the cable connector into the Roof Module. Push the connector in until it “clicks” and locks in place. To remove, grasp the connector to compress the two side latches and pull away from the Roof Module.

Note: Do not force the connector. If the connector does not engage easily, check for the correct orientation of the connector.

Figure 7-15 Roof Module Main Cable Harness Connection



4. Attach the LAN connector to the Roof Module. See *Figure 7-16*.

   Orient the Ethernet cable connector with the connector under the receiver so the contacts on the cable connector are pointing towards the back of the vehicle. (This will usually be towards your right side if you are standing on the left side of the vehicle and looking towards the Roof Module.) Slide the cable connector into the receiver and rotate the plastic bayonet sleeve clockwise to lock the connector. The bayonet sleeve will “click” when it fully engages and locks. To remove the cable, rotate the bayonet sleeve counterclockwise until it “clicks” and pull the connector down or away from the Roof Module.

Note: Do not force the connector. If the connector does not engage easily, check for the correct orientation of the connector.

Figure 7-16 Roof Module Ethernet Connection

Main Cable Harness Connections Inside Cab

Figure 7-17 shows the Main Cable Harness connections used inside the cab. *Table 7-1* shows the functions of the Main Cable Harness cab connectors. Refer to your Display user manual for instructions on connecting the Main Cable Harness connections shown to the correct ports and harnesses on the Display and Display cables.

Figure 7-17 Main Cable Harness Cab Connections

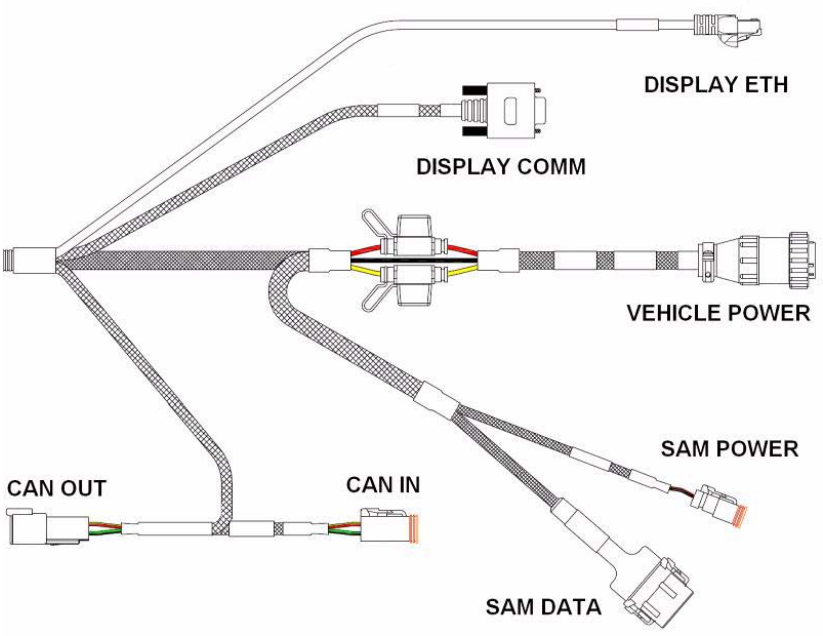


Table 7-1 Cab Main Cable Harness Connector Functions

Main Cable Harness Connector	Connector Function
DISPLAY ETH	Display Ethernet Port (RJ-45)
DISPLAY COMM	Display Communication Port (DB-9)
VEHICLE POWER	12 Volt Power
SAM POWER	Power for SA Module
SAM DATA	Data for SA Module
CAN IN	Not Used for This Installation
CAN OUT	Not Used for This Installation

SA Module Harness

1. Connect the SA Module Harness to the Main Cable Harness using the 4-pin connector and 12-pin connector. See *Figure 7-18*.

Note: The 4-pin connector will not be used unless a remote engage switch (foot switch) is installed. See *Figure 7-18*.

Figure 7-18 SA Module Harness and Main Cable Harness Connections

Power Supply Connection

The following sub-sections describe basic instructions for connecting the AutoSteer system to available vehicle power sources:

- *Cab Power Connection*
- *Battery Power Connection*

Note: Refer to your Display user manual before connecting the AutoSteer system to vehicle power.

The AutoSteer Main Cable Harness must be connected to a 3-pin 12V power source. Your Display user manual provides specific instructions for connecting power to the AutoSteer system and specifies the appropriate vehicle power source.

Cab Power Connection

1. Locate the 12V power outlet on the cab console right side. See *Figure 7-19*.
2. Use this 12V accessory power connector if the Display user manual specifies connecting to power inside the cab. See *Figure 7-19*.

Figure 7-19 Cab 12V Power Outlet

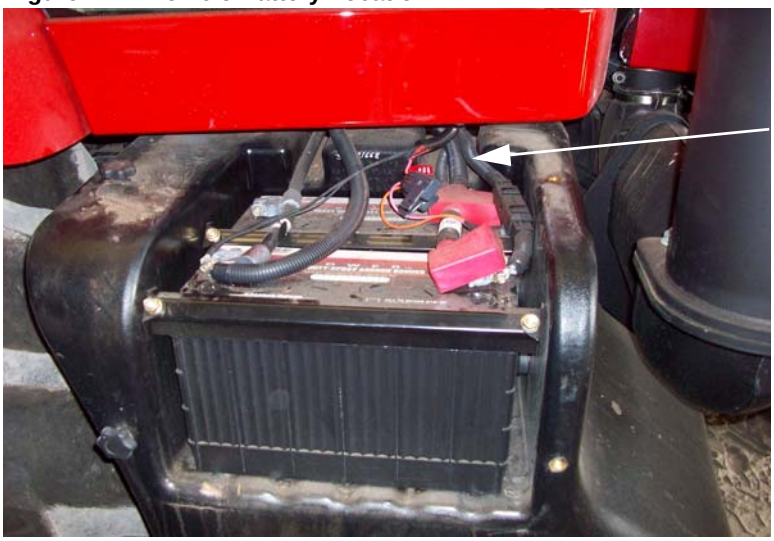
Battery Power Connection

1. Locate the vehicle battery and remove its cover. See *Figure 7-20*.
2. Connect to the vehicle battery if the Display user manual specifies a direct battery connection.

Figure 7-20 Vehicle Battery Location

3. Attach the power cable directly to the battery. See *Figure 7-21*.

Figure 7-21 Vehicle Battery Location



Note: A battery cable is provided with the AutoSteer system when a direct battery connection is required.

4. Route the power cable underneath the cab to the battery. Use the cable ties to secure the cable in a protected position.

Post-Installation Procedures and Information

The **Post-Installation Procedures and Information** chapter provides information in the following sections:

- *Hydraulic Leak Check*
- *Create New Vehicle*
- *Calibration and Tuning Guidelines*
  - *Transducer Calibration*

Once the entire AutoSteer system, including the Display and display harnesses, have been installed on the vehicle, the procedures and notes provided in this chapter must be followed to complete the installation and prepare the vehicle for full AutoSteer capabilities.

Hydraulic Leak Check

On completion of installing the entire AutoSteer system including the Roof Module and Display, the system needs to be checked for leaks. Follow the procedure below to check for leaks.

1. Clear any bystanders away from the vehicle. If there is a hydraulic leak, they could be injured.
2. Put the vehicle into Park and/or set the parking brake to prevent the vehicle from moving.
3. Turn the vehicle over for a few seconds and if the vehicle starts, immediately shut it down.
4. Walk around the vehicle and check all the hydraulic fittings that were opened. Look for any oil leaks.
5. Once all leaks have been repaired, or if none are found, start the vehicle again and let it run at a low idle.

Note: If an oil leak is noticed during any part of this test, immediately shut down the vehicle and repair the leak.

Note: The front wheels will move when the steering wheel is turned. Make sure the vehicle will not strike anything or anyone before continuing. If necessary, move the vehicle to an open area.

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6. Take the vehicle out of Park and/or remove the parking brake. Turn the steering wheel manually to the right and left stops two or three times to get any air out of the hoses.
7. Confirm the front wheels turn in the correct direction and the vehicle steers the same as it did before the system was installed.
8. Put the vehicle back into Park and/or reset the parking brake. Shut down the vehicle, walk around it again, and check for any hydraulic leaks.

9. Once the leaks have been repaired, or if none are found, start the vehicle again and let it run at a low idle.
10. Take the vehicle out of Park and/or remove the parking brake. Move the vehicle to an open, flat area and leave the vehicle in Park.
11. Power up the Display and navigate to the **Hydraulic Valve** window from the **Steering Components** window.
12. Command the vehicle to turn Right and then Left a few times. The vehicle should steer in the direction it is commanded. If the vehicle rotates in the wrong direction, the hoses were attached to the wrong ports on the AutoSteer valve and need to be switched.
13. Power down the Display, put the vehicle back into Park and/or reset the parking brake, and shutdown the vehicle.
14. Once again check the vehicle for hydraulic leaks and repair any that are found.

Create New Vehicle

Note: Do not start the vehicle until after the Hydraulic Leak Test has been performed on the vehicle. After the vehicle has been created, shut down the AutoSteer system prior to starting the vehicle.

Once the entire system has been installed, the operator must first create a new vehicle profile. This configures the system so the User display can properly communicate with the various sensors and components on the vehicle. Follow the procedure below to create a new vehicle.

1. Make sure the User display is not powered ON.
2. Start the vehicle and take it to a clear area (such as an open field) where it can be calibrated.
3. Power up the AutoSteer system.
4. Follow the instructions provided in the Display user manual to create a new vehicle.

Calibration and Tuning Guidelines

Note: For optimal steering performance, the AutoSteer system must be fully calibrated and then tuned.

Transducer Calibration

The transducer calibration procedure on this vehicle is different than other AutoSteer installations because the transducer is measuring a low pressure Load Sense pressure signal. In order to provide good manual kick-out response, you must calibrate the pressure transducer HIGH number to be about 3000 counts above the LOW number.

Confirm that the pressure transducer calibration is correct by testing the manual kick-out feature while driving in AutoSteer mode. AutoSteer should disengage when you turn the steering wheel. If spontaneous kick-out occurs while in AutoSteer mode, recalibrate the pressure transducer and increase the HIGH value slightly. Repeat this procedure until you obtain good manual kick-out without spontaneous kick-out in AutoSteer mode.

On this vehicle, the steering wheel will turn freely and AutoSteer should kick-out when the driver turns the steering wheel while in AutoSteer mode.

Final Hardware Installation Checklist

This **Final Checklist** chapter contains the verifications steps necessary after the installation of the AutoSteer system.

Note: The Final Hardware Installation Checklist is on the back of this page. Tear this page out of your manual and fill in the checklist after the installation. You should keep a copy of this checklist for future reference when servicing the vehicle.

Machine Model: _____ Year: _____ Serial #: _____

Customer Name: _____

Location/Address: _____

AutoSteer Installation Kit Part Number: _____

NOTES

_____

_____

_____

_____

_____

_____

Name of Installer: _____ Date: _____

System Installation Checklist

1. Wheel Angle Sensor installed and all fasteners are tight. (optional) ☐
2. Display Bracket and Display are installed and all fasteners are tight. ☐
3. Roof Rail and Roof Module are installed and all fasteners are tight. ☐
4. SA Module is installed and all fasteners are tight. ☐
5. All cable ends are connected. ☐
6. All cables are secured with cable ties. ☐

Hydraulic Installation Checklist

1. Steering Valve Bracket is installed and all fasteners are tight. ☐
2. Steering Valve is installed and all fasteners are tight. ☐
3. All hose fittings are tight. ☐
4. Check for oil leaks on all hydraulic connections. ☐
5. All hoses are routed and secured with cable ties. ☐
6. Manual steering is normal after the AutoSteer installation. ☐
7. Relief Valve is adjusted. ☐

AutoSteer Performance Checklist

1. Complete AutoSteer system calibration. ☐
2. Complete AutoSteer system tuning. ☐
3. Check total Wheel Angle Sensor counts. (optional) ☐ Value_____
4. Line acquisition is satisfactory. ☐
5. On-line steering is satisfactory. ☐
6. Manual override (kick-out) is working. ☐
7. Steering speed from lock-to-lock is satisfactory. ☐ Value_____Sec.

Note: See the *Post-Installation Procedures and Information* chapter for additional information.

Snap-to-Connect (STC) Fitting Overview

This **Snap-to-Connect (STC) Fitting Overview** chapter contains information regarding STC hydraulic hose fitting connector usage. This information is contained in the following sections:

- *STC Connectors*
- *STC Fittings and Tools*
- *STC Fitting Disconnection*
- *STC Fitting Connection*
- *STC Connector Usage*

STC Connectors

Some newer vehicles are equipped with quick-disconnect hose fittings on the Orbitrol. These hose fittings are called STC fittings and require a special disconnect tool to disconnect. However, no tools are required for assembly because of the connector snap fit. See *Figure 10-1*.

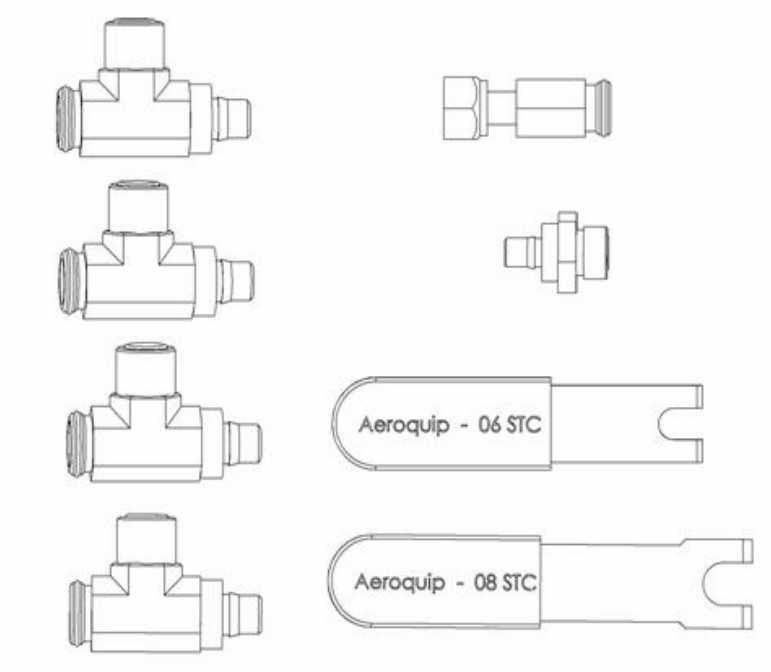
Figure 10-1 STC Fittings on an Orbitrol

The optional STC Adapter kit includes special STC adapters to connect the steering system hoses to machines that use STC fittings on the Orbitrol. The STC run tees replace the normal ORFS run tees on the Pressure, Tank, Left, and Right ports on the Orbitrol. The male and female STC adapters allow the connection of the hoses to the existing Load Sense lines.

STC Fittings and Tools

Two sizes of STC tools are provided in the kit. The larger STC-8 tool is used with the run tees while the smaller STC-6 tool is used on the Load Sense lines. See *Figure 10-2*.

Figure 10-2 STC Connectors and Release Tool Kit (PN: 500-0299-01)

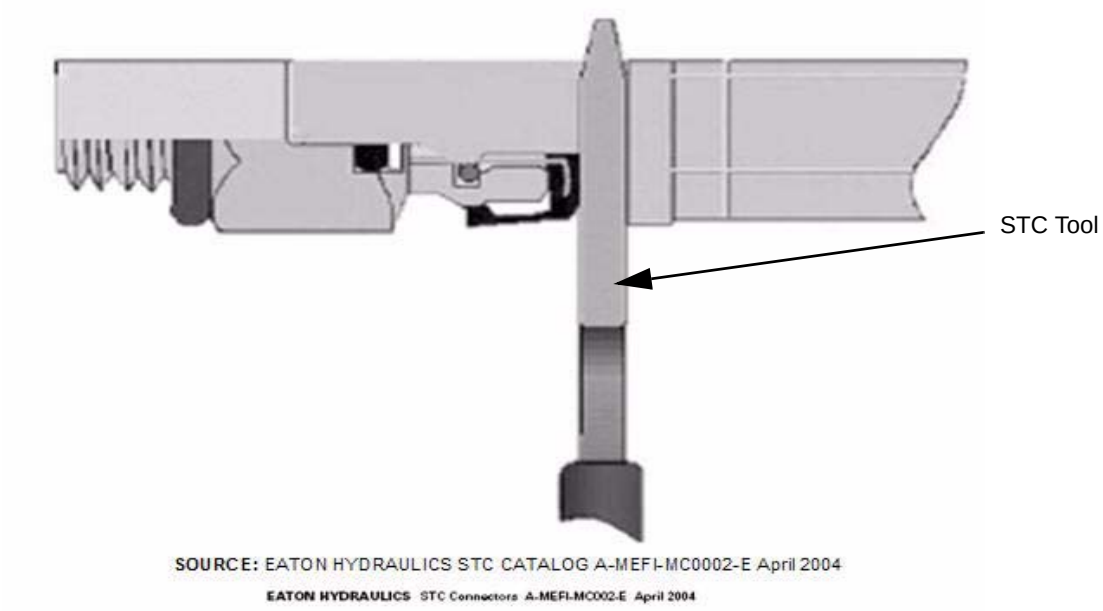


STC Fitting Disconnection

As the STC tool is inserted behind the release sleeve, the steel insert pushes the latching ring forward into a groove in the female half I.D., allowing the two halves to be pulled apart. See *Figure 10-3*. The thickness of the tool moves the sleeve forward far enough to make the disconnection, so prying sideways with the tool is unnecessary.

Note: Do not use the disconnection tool to pry on the parts. Prying can result in damage. Insert the tool straight into the connection. See *Figure 10-3*.

Figure 10-3 STC Connector Disconnection


STC Tool
SOURCE: EATON HYDRAULICS STC CATALOG A-MEFI-MC0002-E April 2004
EATON HYDRAULICS STC Connectors A-MEFI-MC002-E April 2004

STC Fitting Connection

To ensure proper STC fitting connection use the following guidelines:

- Assembly – Align the STC Fitting on the hose assembly with the STC connector. Push the hose fitting into the mating connector until you feel a definite snap and a solid stop. See *Figure 10-4*.
- Verification – Pull on the connection to ensure the male connector has been properly inserted into the female connector. Ensure the direction of pull is parallel to the axis of the STC connection. See *Figure 10-4*.

Figure 10-4 STC Connector Usage Guidelines

Assembly Method

Align the STC fitting on the hose assembly with the STC connector. Push the hose fitting into the mating connector until you feel a definite snap and a solid stop.

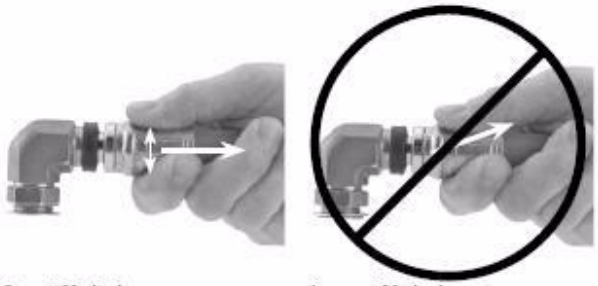
Correct Method

Incorrect Method

Do not hold sleeve during assembly

Assembly Verification

Verify that the STC connection has been made successfully by pulling on the connection to make sure that the male connector has been properly inserted into female connector. Be sure that the direction of pull is parallel to the axis of the STC connection.



Correct Method

Pulling parallel to the connections axis

Incorrect Method

Pulling at an angle to connections axis

Correct Method

Pulling on the fitting such that the motion is parallel to the connections axis.

Incorrect Method

Subjecting the connection to a sideload by pulling on the hose.

SOURCE: EATON HYDRAULICS STC CATALOG A-MEFI-MC0002-E April 2004

EATON HYDRAULICS STC Connectors A-MEFI-MC002-E April 2004

STC Connector Usage

The STC run tees for the Pressure, Tank/Return, Left, and Right ports on Orbitrol are shown in *Figure 10-5*.

Figure 10-5 Run Tees

The STC adapters for the Load Sense line connections are shown in *Figure 10-6*.

Figure 10-6 STC Adapters